
*
* WELCOME TO MESSENGER (APS TEXT) AT USPTO *
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* THE USPTO PRODUCTION FILES ARE CURRENT THROUGH: *
* JUNE 9 1998 FOR U.S. PATENT TEXT DATA. *
* JUNE 9 1998 FOR U.S. CURRENT CLASSIFICATION DATA. *
* JUNE 9 1998 FOR U.S. PATENT IMAGE DATA. *

* WELCOME TO THE *
* U.S. PATENT TEXT FILE *

(FILE 'USPAT' ENTERED AT 14:39:16 ON 15 JUN 1998)

L1 13 S (DIOL OR GLYCEROL)(2N)(DEHYDRASE OR DEHYDRATASE)
L2 3 S DHAT
L3 31 S DHAB?

L2

1. 5,686,276, NOV. 11, 1997, BIOCONVERSION OF A FERMENTABLE CARBON SOURCE TO 1,3-PROPANEDIOL BY A SINGLE MICROORGANISM; LISA ANNE LAFFEND, ET AL., 435/158, 252.31, 252.33 [IMAGE AVAILABLE]

2. 5,086,386, FEB. 4, 1992, METHOD AND APPARATUS FOR BENCHMARKING THE WORKING SET OF WINDOW-BASED COMPUTER SYSTEMS; NAYEEM ISLAM, 707/202; 364/264, 264.3, 280, 280.6, 281.3, 282, 285, 286, 286.3, 927.2, 927.4, 927.63, 927.81, 928, 929.12, 931, 931.5, 932, 932.1, 932.4, 932.5, 946.2, 950, 950.3, 950.4, 957, 957.1, 957.8, 962, 962.4, 975.4, DIG.1, DIG.2; 395/182.14 [IMAGE AVAILABLE]

3. 3,948,331, APR. 6, 1976, TRACK ASSEMBLY FOR SNOWMOBILES; RICHARD E. ESCH, 305/132; 180/193 [IMAGE AVAILABLE]

US PAT NO: 5,686,276 [IMAGE AVAILABLE] L2: 1 OF 3

SUMMARY: BSUM(14)

IN KLEBSIELLA PNEUMONIAE AND CITROBACTER FREUNDII, THE GENES ENCODING THE FUNCTIONALLY LINKED ACTIVITIES OF GLYCEROL DEHYDRATASE (DHAB), 1,3-PROPANEDIOL OXIDOREDUCTASE ("DHAT"), GLYCEROL DEHYDROGENASE (DHAD), AND DIHYDROXYACETONE KINASE (DHAK) ARE ENCOMPASSED BY THE DHA REGULON. THE DHA REGULONS FROM CITROBACTER AND KLEBSIELLA.

DETDSC: DETD(60) THE . . . ACHIEVED BY PLACING THE NECESSARY STRUCTURAL GENES UNDER THE CONTROL OF ALTERNATE PROMOTORS AS HAS BEEN DEMONSTRATED FOR 1,3-PROPANEDIOL OXIDOREDUCTASE ("DHAT") FROM C. FREUNDII AND DIOL DEHYDRATASE FROM K. OXYTOCA ATCC 8724 (DANIEL ET AL., J. BACTERIOL. 177, 2151 (1995) AND. . .

L3

1. 5,753,723, MAY 19, 1998, DENTURE FIXATIVE WITH AN ADHESION PROMOTER; TIANG SHING CHANG, ET AL., 523/120; 106/35; 514/574; 524/42, 239, 321, 549, 559 [IMAGE AVAILABLE]

2. 5,750,591, MAY 12, 1998, DENTURE ADHESIVE CONTAINING PARTIAL IRCONIUM, CALCIUM, SODIUM GANTREZ SALT; HAL C. CLARKE, ET AL., 523/120; 433/228.1; 523/118; 524/45, 559; 525/370 [IMAGE AVAILABLE]

3. 5,723,106, MAR. 3, 1998, REDUCED ALCOHOL MOUTHWASH ANTISEPTIC AND ANTISEPTIC PREPARATION; R. MICHAEL BUCH, ET AL., 424/49, 58 [IMAGE AVAILABLE]

4. 5,699,269, DEC. 16, 1997, METHOD FOR PREDICTING CHEMICAL OR PHYSICAL PROPERTIES OF CRUDE OILS; TERRENCE RODNEY ASHE, ET AL., 702/30; 436/29, 60 [IMAGE AVAILABLE]

5. 5,696,181, DEC. 9, 1997, DENTURE FIXATIVE; TIANG-SHING CHANG, ET AL., 523/118; 430/180; 523/120; 524/28, 45, 55, 377, 439, 440 [IMAGE AVAILABLE]

6. 5,686,276, NOV. 11, 1997, BIOCONVERSION OF A FERMENTABLE CARBON SOURCE TO 1,3-PROPANEDIOL BY A SINGLE MICROORGANISM; LISA ANNE LAFFEND, ET AL., 435/158, 252.31, 252.33 [IMAGE AVAILABLE]

7. 5,650,479, JUL. 22, 1997, INTERFACIALLY POLYMERIZED POLYESTER FILMS; PAUL G. GLUGLA, ET AL., 528/194; 95/43, 54; 210/500.21, 500.26; 528/176, 193 [IMAGE AVAILABLE]

8. 5,569,581, OCT. 29, 1996, ALTERATION AND PREDICTION OF MALE FERTILITY USING SEMINAL PLASMA AND ITS COMPONENTS; GARY KILLIAN, ET AL., 435/4; 424/520; 435/806 [IMAGE AVAILABLE]

9. 5,561,177, OCT. 1, 1996, HYDROCARBON FREE DENTURE ADHESIVE; NILOFAR KHALEDI, ET AL., 524/35; 433/180; 523/120; 524/43, 45, 313, 492 [IMAGE AVAILABLE]

10. 5,543,443, AUG. 6, 1996, DENTURE STABILIZING COMPOSITIONS; JAYANTH RAJIAIAH, ET AL., 523/120; 522/148; 523/116, 118; 524/28, 31, 45, 55, 261, 267, 377, 522, 557; 525/100, 101, 102, 207, 328.9, 366, 474, 477, 478, 479; 526/279; 528/15, 26, 31, 32, 33, 374 [IMAGE AVAILABLE]

11. 5,461,155, OCT. 24, 1995, ORGANIC SOLUBLE METAL-AZO AND METAL-AZOMETHINE DYES; TERRANCE P. SMITH, ET AL., 546/12 [IMAGE AVAILABLE]

12. 5,424,058, JUN. 13, 1995, DENTURE STABILIZING COMPOSITIONS COMPRISING A MIXED PARTIAL SALT OF A LOWER ALKYL VINYL ETHER-MALEIC ACID COPOLYMER; JAYANTH RAJIAIAH, ET AL., 424/49; 106/35; 523/120; 525/328.9, 366, 370; 526/240 [IMAGE AVAILABLE]

13. 5,405,836, APR. 11, 1995, PET FOODS WITH WATER-SOLUBLE ZINC COMPOUND COATING FOR CONTROLLING MALODOROUS BREATH; THOMAS RICHAR, ET AL., 514/23; 424/49, 53, 439, 442; 426/72, 74, 805 [IMAGE AVAILABLE]

14. 5,314,998, MAY 24, 1994, ORGANIC SOLVENT-SOLUBLE METAL-AZO AND METAL-AZOMETHINE DYES; TERRANCE P. SMITH, ET AL., 534/701, 710, 711, 713, 723 [IMAGE AVAILABLE]

15. 5,304,616, APR. 19, 1994, DENTURE STABILIZING COMPOSITIONS HAVING IMPROVED HOLD; JAYANTH RAJIAIAH, ET AL., 526/240; 523/118, 120; 525/327.8 [IMAGE AVAILABLE]

16. 5,242,834, SEP. 7, 1993, ANALYSIS OF ALUMINUM IN AMINO ACIDS BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY; DURGA V. SUBRAMANIAN, 436/73; 73/61.52; 210/656; 436/74, 161, 174, 175, 182 [IMAGE AVAILABLE]

17. 5,225,514, JUL. 6, 1993, AZO CONTAINING POLYURETHANES FOR DRUG DELIVERY TO THE LARGE INTESTINES; YOSHIHARU KIMURA, ET AL., 528/76; 514/772.3; 528/85 [IMAGE AVAILABLE]

18. 5,165,914, NOV. 24, 1992, ORAL COMPOSITIONS CONTAINING ZINC LACTATE COMPLEXES; RICHARD S. VLOCK, 424/52, 49, 641, 642, 643, 673, 676 [IMAGE AVAILABLE]

19. 5,094,845, MAR. 10, 1992, ORAL COMPOSITIONS CONTAINING ZINC GLUCONATE COMPLEXES; RICHARD S. VLOCK, 424/52, 49, 53, 55, 613, 641, 643, 673 [IMAGE AVAILABLE]

20. 5,073,604, DEC. 17, 1991, DENTURE STABILIZING COMPOSITIONS; KENNETH T. HOLEVA, ET AL., 525/327.8; 523/120; 525/327.9, 328.9, 366, 370; 526/240 [IMAGE AVAILABLE]

21. 5,050,692, SEP. 24, 1991, METHOD FOR DIRECTIONAL DRILLING OF SUBTERRANEAN WELLS; HERBERT W. BEIMGRABEN, 175/61, 74, 76, 256 [IMAGE AVAILABLE]

22. 4,980,391, DEC. 25, 1990, DENTURE ADHESIVES AND METHODS FOR PREPARING SAME; LORI D. KUMAR, ET AL., 524/45; 106/35; 523/120; 524/492 [IMAGE AVAILABLE]

23. 4,948,580, AUG. 14, 1990, MUCO-BIOADHESIVE COMPOSITION; IVAN BROWNING, 514/772.5; 424/434, 435, 443, 447, 448, 484; 514/944, 969 [IMAGE AVAILABLE]

24. 4,937,066, JUN. 26, 1990, ZINC CONTAINING ORAL COMPOSITION; RICHARD S. VLOCK, 424/52, 49, 53, 55, 613, 614, 641, 643, 673 [IMAGE AVAILABLE]
25. 4,817,740, APR. 4, 1989, APPARATUS FOR DIRECTIONAL DRILLING OF SUBTERRANEAN WELLS; HERBERT W. BEIMGRABEN, 175/74, 76, 236 [IMAGE AVAILABLE]
26. 4,747,415, MAY 31, 1988, METHOD AND DEVICE FOR MEASURING PENILE RIGIDITY; PIERRE LAVOISIER, 600/587, 507 [IMAGE AVAILABLE]
27. 4,717,260, JAN. 5, 1988, TIME DIFFERENTIAL CORRECTING ANALOG TIMEPIECE OF TWENTY-FOUR HOUR SYSTEM; SHIGERU TSUJI, 368/21; 968/167, DIG.1 [IMAGE AVAILABLE]
28. 4,560,013, DEC. 24, 1985, APPARATUS FOR DIRECTIONAL DRILLING AND THE LIKE OF SUBTERRANEAN WELLS; HERBERT W. BEIMGRABEN, 175/73, 325.2 [IMAGE AVAILABLE]
29. 4,404,088, SEP. 13, 1983, THREE-STAGE HYDROCRACKING PROCESS; ROBERT W. BACHTEL, ET AL., 208/59, 111 [IMAGE AVAILABLE]
30. 3,926,577, DEC. 16, 1975, CORROSION INHIBITOR FOR VANADIUM-CONTAINING FUELS; MICHAEL J. ZETLMEISL, ET AL., 44/320, 354; 252/387 [IMAGE AVAILABLE]
31. 3,691,408, SEP. 12, 1972, METHOD AND MEANS FOR THERMOELECTRIC GENERATION OF ELECTRICAL ENERGY; JOHN B. ROSSO, 310/306; 62/5; 136/209, 211 [IMAGE AVAILABLE]

US PAT NO: 5,686,276 [IMAGE AVAILABLE]

L3: 6 OF 31

SUMMARY: BSUM(14) IN KLEBSIELLA PNEUMONIAE AND CITROBACTER FREUNDII, THE GENES ENCODING THE FUNCTIONALLY LINKED ACTIVITIES OF GLYCEROL DEHYDRATASE (**DHAB**), 1,3-PROPANEDIOL OXIDOREDUCTASE (DHAT), GLYCEROL DEHYDROGENASE (DHAD), AND DIHYDROXYACETONE KINASE (DHAK) ARE ENCOMPASSED BY THE DHA REGULON. THE DHA REGULONS FROM . .

08/849,404

*****Welcome to STN International *****

*****STN Columbus*****

(FILE 'HOME' ENTERED AT 15:35:10 ON 15 JUN 1998)

FILE 'REGISTRY' ENTERED AT 15:35:25 ON 15 JUN 1998

L1 40518 S 1, 3-PROPANEDIOL

L2 7000 S GLYCEROL

L3 74 S DIHYDROXYACETONE

FILE 'CAPLUS' ENTERED AT 15:36:41 ON 15 JUN 1998

FILE 'REGISTRY' ENTERED AT 15:44:28 ON 15 JUN 1998

L4 1 S GLYCEROL DEHYDRATASE

FILE 'CAPLUS' ENTERED AT 15:44:53 ON 15 JUN 1998

L5 61 S L4

L6 94627 S ASPERGILLUS OR SACCHAROMYCES OR ZYGOSACCHAROMYCES OR PICHIA OR KLUYVEROMYCES OR CANDIDA OR HANSENULA

L7 136502 S DEBARYOMYCES OR MUCOR OR TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR BACILLUS OR STREPTOMYCES OR PSEUDOMONAS

L8 222558 S L6 OR L7

L9 3 S L5 AND L8

L10 6439 S 1, 3-PROPANEDIOL

L11 108 S L8 AND L10 NOT L9

L12 219 S 504-63-2P/IT

L13 8 S L12 AND L8

L9 ANSWER 1 OF 3 CAPLUS COPYRIGHT 1998 ACS

AN 1997:34085 CAPLUS DN 126:58953

TI Bioconversion of a fermentable carbon source to 1,3-propanediol by a single microorganism expressing a foreign glycerol or diol dehydratase gene

IN Laffend, Lisa Anne; Nagarajan, Vasantha; Nakamura, Charles Edwin

PA E.I. Du Pont De Nemours and Company, USA; Genencor International, Inc.; Laffend, Lisa Anne; Nagarajan, Vasantha; Nakamura, Charles Edwin

SO PCT Int. Appl., 109 pp. CODEN: PIXXD2

PI WO 9635796 A1 961114

DSW: AL, AU, BB, BG, BR, CA, CN, CZ, EE, GE, HU, IS, JP, KP, KR, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, TR, TT, UA, US, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG

AI WO 96-US6705 960510 PRAI US 95-440293 950512 DT Patent LA English

AB A process is provided for the bioconversion of a carbon substrate, preferably glucose, to 1,3-propanediol by a single organism utilizing microorganisms contg. the genes encoding for an active glycerol or diol dehydratase enzyme. Specifically, the glyceroldehydratase gene of *Klebsiella pneumoniae* is used to prep. a transgenic microorganism capable of forming 1,3-propanediol from glucose in high yield. A cosmid covering the *dha* regulon of *K. pneumoniae* was cloned and the gene for the dehydratase (*dhaB1*, *dhaB2*, *dhaB3*) and the propanediol dehydrogenase were cloned and expressed in a variety of prokaryotic and eukaryotic microbial hosts with the manuf. of the propanediol from glucose or maltose demonstrated.

L9 ANSWER 2 OF 3 CAPLUS COPYRIGHT 1998 ACS

AN 1997:6102 CAPLUS DN 126:30403

TI Process for making 1,3-propanediol from carbohydrates using mixed microbial cultures

IN Haynie, Sharon Loretta; Wagner, Lorraine Winona

PA E.I. Du Pont De Nemours and Company, USA; Haynie, Sharon Loretta; Wagner, Lorraine Winona

SO PCT Int. Appl., 30 pp. CODEN: PIXXD2

PI WO 9635799 A1 961114

DSW: AL, AU, BB, BG, BR, CA, CN, CZ, EE, GE, HU, IS, JP, KP, KR, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, TR, TT, UA, US, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG

AI WO 96-US6161 960502 PRAI US 95-440379 950512 DT Patent LA English

AB The present invention provides a process for the biotransformation of a carbohydrate C source to 1,3-propanediol using mixed yeast and bacterial cultures wherein the carbohydrate is 1st Fermented to glycerol by the yeast cell and then converted to 1,3-propanediol by the bacterial cellcontg. an active diol or glycerol dehydratase enzyme. In this process both the yeast and bacterial cultures are supported on the same C source and 1,3-propanediol is isolated from the media.

L9 ANSWER 3 OF 3 CAPLUS COPYRIGHT 1998 ACS

AN 1995:841557 CAPLUS DN 124:46914

TI Rapid expansion of the physical and genetic map of the chromosome of *Clostridium perfringens* CPN50

AU Katayama, Sei-ichi; Dupuy, Bruno; Garnier, Thierry; Cole, Stewart T.

CS Unite Genetique Moleculaire Bacterienne, Inst. Pasteur, Paris, 75724, Fr.

SO J. Bacteriol. (1995), 177(19), 5680-5 CODEN: JOBAAY; ISSN: 0021-9193 DT Journal LA English

AB The phys. map of the 3.6-megabase chromosome of *Clostridium perfringens* CPN50 was extended by positioning sites for the endonucleases *Sfi*I and *I*-CeuI, and in parallel, the gene map was expanded by using a genome scanning strategy. This involved the cloning and sequencing of random chromosomal fragments, identification of the functions of the putative genes by database searches, and then hybridization anal. The current gene map comprises almost 100 markers, many of which encode housekeeping functions while others are involved in sporulation or Pathogenesis. Strikingly, most of the virulence genes were found to be confined to a 1200-kb segment of the chromosome near *oriC*, while the pleiotropic regulatory locus, *virRS*, was situated toward the putative replication terminus. A comparison of the gene maps of 3 endospore-forming bacilli, *C. perfringens*, *Clostridium beijerinckii*, and *Bacillus subtilis*, revealed a similar order and distribution of key sporulation and heat shock genes which might reflect an ancient evolutionary relationship.

L13 ANSWER 1 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Metabolic engineering of propanediol pathways

L13 ANSWER 2 OF 8 CAPLUS COPYRIGHT 1998 ACS

1

TI Metabolic engineering of an improved 1,3-propanediol fermentation (*Klebsiella pneumoniae*, "Bacillus" *licheniformis*)

L13 ANSWER 3 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Production of 1,3-propanediol from glycerol by recombinant bacteria expressing recombinant diol dehydratase

L13 ANSWER 4 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Bioconversion of a fermentable carbon source to 1,3-propanediol by a single microorganism expressing a foreign glycerol or diol dehydratase gene

L13 ANSWER 5 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Process for making 1,3-propanediol from carbohydrates using mixed microbial cultures

L13 ANSWER 6 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Microbial production and downstream processing of 2,3-butanediol

L13 ANSWER 7 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Fermentative manufacture of 1,3-propanediol from glycerol

L13 ANSWER 8 OF 8 CAPLUS COPYRIGHT 1998 ACS

TI Neutral solvent production from halophilic, photolithotrophically grown algae by linked fermentations

L13 ANSWER 1 OF 8 CAPLUS COPYRIGHT 1998 ACS

AN 1998:56526 CAPLUS DN 128:87891

TI Metabolic engineering of propanediol pathways

AU Cameron, D. C.; Altaras, N. E.; Hoffman, M. L.; Shaw, A. J.

CS Department of Chemical Engineering, University of WisconsinMadison, Madison, WI, USA

SO Biotechnol. Prog. (1998), 14(1), 116-125 CODEN: BIPRET; ISSN: 8756-7938 PB American Chemical Society DT Journal, General Review LA English

AB A review with many refs. Microbial fermn. is an important technol. for the conversion of renewable resources to chems. In this paper, the authors describe the application of metabolic engineering for the development of two new fermn. processes: the microbial conversion of sugars to 1,3-propanediol (1,3-PD) and 1,2-propanediol (1,2-PD). A variety of naturally occurring organisms ferment glycerol to 1,3-PD, but no natural organisms ferment sugars directly to 1,3-PD. The authors first describe the fed-batch fermn. Of glycerol to 1,3-PD by *Klebsiella pneumoniae*. They then present various approaches for the conversion of sugars to 1,3-PD, including mixed-culture fermn., cofermentation of glycerol and glucose, and metabolic engineering of a "sugars to 1,3-PD" pathway in a Single organism. Results are reported for the expression of genes from the *K. pneumoniae* 1,3-PD pathway in "*Saccharomyces cerevisiae*". The best naturally occurring organism for the fermn. of sugars to 1,2-PD is *Thermoanaerobacterium thermosaccharolyticum*. The authors describe the fermn. of several different sugars to 1,2-PD by this organism in batch and continuous culture. They report that *Escherichia coli* strains engineered to express either aldose reductase or glycerol dehydrogenase convert glucose to (R)-1,2-PD. The authors then analyze the ultimate potential of fermn. Processes for the prodn. of propanediols. Linear optimization studies indicate that, under aerobic conditions, propanediol yields that approach the theor. max. are possible and CO2 is the primary coproduct. Without the need to produce acetate, final product titers in the range of 100 g/L should be possible; the high titers and low coproduct levels should make product recovery and purifi. straightforward. The examples given in this paper illustrate the importance of metabolic engineering for fermn. process development in general.

L13 ANSWER 2 OF 8 CAPLUS COPYRIGHT 1998 ACS

AN 1997:517535 CAPLUS DN 127:123605

TI Metabolic engineering of an improved 1,3-propanediol fermentation (*Klebsiella pneumoniae*, "Bacillus" *licheniformis*)

AU Skraly, Frank Anthony

CS Univ. of Wisconsin, Madison, WI, USA

SO (1997) 221 pp. Avail.: UMI, Order No. DA9716075 From: Diss. Abstr. Int., B 1997, 58(3), 1414 DT Dissertation LA English

AB Unavailable

L13 ANSWER 7 OF 8 CAPLUS COPYRIGHT 1998 ACS

AN 1990:234037 CAPLUS DN 112:234037

TI Fermentative manufacture of 1,3-propanediol from glycerol

IN Kretschmann, Josef; Carduck, Franz Josef; Deckwer, Wolf Dieter; Tag, Carmen

PA Henkel K.-G.a.A., Fed. Rep. Ger.; Gesellschaft fuer Biotechnologische Forschung m.b.H. (GBF)

SO Ger. Offen., 7 pp. CODEN: GWXXBX

PI DE 3829618 A1 900315 AI DE 88-3829618 880901 DT Patent LA German

AB Propane-1,3-diol is manufd. from a glycerol-contg. soh. (5-20% by wt.) with a microorganism such as *Clostridium*, *Enterobacterium*, *Lactobacillus*, "*Bacillus*", *Citrobacter*, or *Klebsiella* in a yield of .gtoreq.0.5 g/hL. *Klebsiella pneumoniae* DSM 2026 was batch-cultured at 37 degree. under anaerobic conditions to yield a max. of 2.3 g propane-1,3-diol from a starting glycerol concn. of 100 g/L; other glycerol concns. (50-200 g/L) produced lower yields.

L13 ANSWER 8 OF 8 CAPLUS COPYRIGHT 1998 ACS

AN 1983:214106 CAPLUS DN 98:214106

TI Neutral solvent production from halophilic, photolithotrophically grown algae by linked fermentations

AU Nakas, J. P.; Schaedle, M.; Parkinson, C. M.; Coonley, C. E.; Tanenbaum, S. W.

CS Coll. Environ. Sci. For., SUNY, Syracuse, NY, 13210, USA

SO Comm. Eur. Communities, [Rep.] EUR (1983), EUR 8245, Energy Biomass, 298-302 CODEN: CECED9 DT Report LA English

AB Five species of *Dunaliella* were examd. for glycerol [56-81-5] accumulation, growth rate, cell d., and protein and chlorophyll content. The suitability of each algal species for such bioconversions was judged according to glycerol accumulation and quantities of neutral solvents produced after sequential bacterial fermns. When grown in 2M NaCl with 24 mM NaHCO3 or 3% CO2 at28.degree., and with 25,000 lx at container surface, 4 of the 5 species tested (D. tertiolecta, D. primolecta, D. parva, and D. bardawil) produced 10-20 mg of glycerol/L. A *Clostridium* converted an algal biomass mixt. supplemented with 4% glycerol to .apprx. 18 g/L of mixed alcs. (EtOH [64-17-5], 1,3-propanediol [504-63-2], and BuOH [71-36-3]). Acetone was not detected. A soil isolate, tentatively classified as a member of the genus "*Bacillus*", converts glycerol intoEtOH at a final concn. of 7.0-9.6 g/L. An enrichment culture from sewage sludge required to contain 2 gram-neg. rods converts the algal biomass-glycerol mixt. solely to 1,3-propanediol [504-63-2] at a final concn. of 4.2-5.3 g/L. Addnl., *Dunaliella* concs., of .ltoreq.200-fold, can be directly fermented to mixed solvents.



16jun98 07:58:45 User208600 Session D1155.1

File 351:DERWENT WPI 1963-1998/UD=9823;UP=9820;UM=9818 (c)1998
Derwent Info Ltd

Set Items Description

S1 0 PN=3829618

S2 0 IN=KRETSCHMANN, J?

S3 0 AU=KRETSCHMANN, J?

S4 1 PN= DE 3829618

S5 0 CN=504-63-2

S6 29 CN=R01300-P

S7 10007 ASPERGILLUS OR SACCHAROMYCES OR
ZYGOSACCHAROMYCES OR PICHIA OR KLUYVEROMYCES OR CANDIDA
OR HANSENULA OR DEBARYOMYCES OR -
MUCOR

S8 18645 TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR
BACILLUS OR STREPTOMYCES OR PSEUDOMONAS

S9 26603 S7 OR S8

S10 2 S6 AND S9

S11 2019 TRIMETHYLENE(W)GLYCOL OR 1(W)3(W)(PROPANEDIOL OR
PROPANE (-N)DIOL)

S12 41 S11 AND S9 NOT S10

4/7/1 DIALOG(R)File 351:DERWENT WPI (c)1998 Derwent Info Ltd. All rts. reserv.

008197141

WPI Acc No: 90-084142/199012

Conversion of glycerol to propane 1,3-diol - by fermentation using glycerol as sole source of carbon
Patent Assignee: GBF GES BIOTECHN FORSCH (GBFB); HENKEL KGAA (HENK); GBF GES BIOTECH
FORSCHUNG GMBH (GBFB)

Inventor: CARDUCK E J; DECKWER W D; KRETSCHMANN J; TAG C; BIEBL H; CARDUCK F; DECKWER W;
KRETSCHMANN J

Number of Countries: 003 Number of Patents: 003

Patent Family:

Patent No Kind Date Applicat No Kind Date Main IPC Week

DE 3829618 A 19900315 DE 3829618 A 19880901 199012 B

JP 3065192 A 19910320 JP 89228160 A 19890901 199118

US 5254467 A 19931019 US 89402209 A 19890901 C12P-007/04 199343

US 91691648 A 19910425

Priority Applications (No Type Date): DE 3829618 A 19880901; DE 3924423 A 19890724

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

DE 3829618 A 7

US 5254467 A 8 CIP of US 89402209

Abstract (Basic): DE 3829618 A

Glycerol is converted to 1,3-propanediol by using a strain of Clostridium, Enterobacterium, Lactobacillus, Bacillus, Citrobacter, Aerobacter, or Klebsiella, which, under standard fermentation conditions, converts a 5% glycerol soln. as sole C source to 1,3-propanediol at a space-time yield of more than 0.5 g/hl. These are used for the technical conversion of 5-20% glycerol solns., as sole C source, under anaerobic conditions and at constant pH. After consumption of the glycerol, the biomass is sep'd., and the prod. mixt. is processed by distn. USE/ADVANTAGE - Esp. that obtd. in processing triglycerides (claimed). Other useful prods. may be obtd. in addn. to propane diol, e.g. 2,3-butane diol, ethanol, acetoin, acetic and/or lactic-acid. Glycerol solns. of concn. up to 20 wt.% can be used. The solns. need not be pure. 0/0

Abstract (Equivalent): US 5254467 A

Transformation of glycerol into 1,3-propanediol by microorganisms comprises fermenting, under standard anaerobic fermentation conditions and constant pH, a strain selected from clostridium butyrium SH1 (DSM 5431) and clostridium butyrium AK1 (DSM 5430) and mutants in a medium comprising aq. glycerol soln. contg. 5-20 wt.% glycerol to produce a biomass and 1,3-propanediol soln. in a vol./time yield to more than 2.2 g/hr-lE-1, a, and sepd. 1,3-propanediol from the biomass. The glycerol soln. is a triglyceride processing stream from the saponification of fats having a low lauric acid content. The soln. pref. comprises 10-15 wt.% glycerol, the pH is maintained at 6.5-8 and the temp. is pref. 27-40 deg. C. The inoculum is pref. 5-20 vol.%.

USE/ADVANTAGE - The fermentation is easy to handle on an industrial scale and is capable of converting high concns. of glycerol into propanediol under standard fermentation conditions with a vol./time yield of more than 0.5 g/hr-lE-1 with the expected catadolic repression which is normally encountered with media accumulating high propanediol concns.

Dwg.0/0

Derwent Class: D16; E17

International Patent Class (Main): C12P-007/04

International Patent Class (Additional): C07C-031/20; C12P-007/18; C12R-001/145

6/7/1 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propane-diol production using phosphine ligand-free cobalt catalyst - giving high yield and selectivity and allowing almost complete recovery of cobalt catalyst

6/7/2 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Selective and economic 1,3-propane-diol prepn. for polyester prodn. - by reacting cobalt salt with synthesis gas, contacting with ethylene oxide in non-water-miscible liq., and hydrogenating 3-hydroxy-propanal

6/7/3 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of 1,3-propane diol - comprises hydrogenation of glycidolaldehyde in aq. soln. contg. alcohol(s) in the presence of nickel catalyst.

6/7/4 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Fermentative prodn. of 1,3-propane-diol useful for polymer prodn. - from carbon substrates using mixed culture of glycerol-producing and diol-producing organisms

6/7/5 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prodn. of 1,3-propanediol, useful in polymer prodn. - by fermenting carbon source with single dehydratase expressing microbe, partic. recombinant E. coli carrying Klebsiella gene

6/7/6 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Cosmid contg. Klebsiella pneumoniae gene for diol dehydratase - and related transformed microorganisms able to convert glycerol to 1,3-propanediol for polymer prodn

6/7/7 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Purifying carbonyl-contg. 1,3-propane-diol compsn., used in condensn. polymer prepn. - by forming acidic soln. of the 1,3-propane-diol compsn. adding base, distilling water and then prod. from basic soln.

6/7/8 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-propane-diol prepn. used in polyester mfr. - by reacting ethylene oxide, carbon monoxide and hydrogen over an arsine promoted cobalt carbonyl catalyst.

6/7/9 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propane-diol prepn. for fibres for high yield and selectivity - by reacting ethylene oxide carbon monoxide and hydrogen over quat. phosphonium salt promoted cobalt carbonyl catalyst, for polyester mfr..

6/7/10 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-propane-diol prepn. - by reacting ethylene oxide, carbon monoxide and hydrogen@ over quat. ammonium salt promoted cobalt carbonyl catalyst, used in polyester mfr.

6/7/11 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prodn of 1,2- and 1,3-propanediol from aq. glycerol - by catalytic dehydration, hydration and hydrogenation

6/7/12 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-propanediol and 3-hydroxy-propanal prepn. - by reacting ethylene oxide with carbon monoxide and hydrogen@ over promoted phosphine complex cobalt carbonyl and ruthenium catalysts

6/7/13 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Acrolein prodn. - by dehydration of a glycerine-water mixt. using a solid acid catalyst, esp. a zeolite

6/7/14 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Increasing yield in propane-1,3-diol prodn. from acrolein - by hydration and catalytic hydrogenation by cracking 4-oxa-heptane-1,7-diol sepd. from high boiling by-product over solid acid catalyst

6/7/15 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Bacterial prod. for converting glycerol to 1,3-propanediol in high yield - derived from new anaerobic strains of Enterobacter, Corynebacterium or Citrobacter

6/7/16 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propane-diol prodn. for polyester prodn., etc. - by catalytic hydrogenation of hydroxypropionaldehyde in aq. soln. in a solid-bed or suspension system

6/7/17 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Propane-1,3-diol prodn. - by hydrogenation of hydroxy-propionaldehyde on catalyst contg. specified percentage of finely divided platinum@, on titanium dioxide support

6/7/18 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Propane-1,3-diol prepn. - by reacting acrolein and water in presence of chelate building ion-exchange resin and catalytically hydrogenating 3-hydroxypropionaldehyde formed

6/7/19 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Enhancing stability of polymeric reverse osmosis membrane - by contacting membrane with soln. contg. stabilising amt. of polyvalent cation (s)

6/7/20 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propanediol prepn. by hydration of acrolein - in aq. soln. over hydrated alumina-bound zeolite of pore size greater than 5 angstroms

6/7/21 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Anaerobic microbial conversion of substrate to metabolite - is in airlift reactor with passage of inert gas

6/7/22 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-propanediol prodn. from acrolein - by hydration using phosphonic acid resin catalyst, followed by catalytic hydrogenation

6/7/23 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propane diol mfr. by epoxide hydrocarbonylation - by reacting ethylene oxide, tricyclohexylphosphine, water, carbon monoxide, hydrogen and opt. an acid using rhodium catalyst in ether

6/7/24 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Microbiological prepn. of 1,3-propane-diol - from glycerol and a sugar hydrogen-donor, under controlled addn. conditions

6/7/25 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

1,3-Propane diol prodn. by fermentation of aq. glycerine soln. - with selected microorganism, then removal of biomass and distn. of prod.

6/7/26 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Conversion of glycerol to propane 1,3-diol - by fermentation using glycerol as sole source of carbon

6/7/27 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

High yield microbial prodn. of 1,3-propane diol from glycerine - using Klebsiella pneumoniae in media contg. cobalt salt and sugar

6/7/28 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Purificn. of propane 1,3 diol - prepd. by addn. of water to acrolein, by extraction with cyclohexane

6/7/29 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prodn. of propane-diol from glycerol - using carbon monoxide and hydrogen in a basic organic solvent in the presence of tungsten and Gp-VIII metal?

FILE 'REGISTRY' ENTERED AT 12:11:54 ON 09 DEC 1997
L1 477 S HYDRATASE?

FILE 'MEDLINE' ENTERED AT 12:12:06 ON 09 DEC 1997
L2 1 S L1

FILE 'REGISTRY' ENTERED AT 12:12:32 ON 09 DEC 1997
L3 581 S DEHYDRATASE?

FILE 'MEDLINE' ENTERED AT 12:12:50 ON 09 DEC 1997
L4 5 S L3

FILE 'REGISTRY' ENTERED AT 12:13:58 ON 09 DEC 1997
L5 1 S GLYCEROL DEHYDRATASE
L6 2 S DIOL DEHYDRATASE

FILE 'MEDLINE' ENTERED AT 12:14:36 ON 09 DEC 1997
L7 0 S L5
L8 0 S L6
E DEHYDRATASES/CT
E E4
E DEHYDRATASE/CT
E DEHYDRATASE/CN
E HYDRO LYASES
E HYDRO LYASES/CT
L9 2938 S E9
L10 77716 S CLONING, MOLECULAR/CT
L11 125 S L9 AND L10
L12 37111 S KLEBSIELLA OR LACTOBACILLUS OR ENTEROBACTER OR CITROBACTER OR PELOBACTER OR ILYOBACTER OR CLOSTRIDIUM
L13 4 S L11 AND L12
E GLYCEROL DEHYDRATASE
E GLYCEROL DEHYDRATASE/CT
E DIOL DEHYDRATASE
E DIOL DEHYDRATASE/CT
E DIOL DEHYDRATASE/CN
E GLYCEROL DEHYDRATASE/CN
L14 12 S E3
L15 0 S L14 NOT L9
L16 155 S L12 AND L9 NOT L13
E KLEBSIELLA/CN
E KLEBSIELLA/CT
E L9
E HYDRO LYASES/CT
L17 291 S E22
L18 7 S L17 AND L12
L19 3 S L18 NOT L13

FILE 'SCISEARCH' ENTERED AT 12:32:16 ON 09 DEC 1997
E SPRENGER G, 1989/RE
E SPRENGER G A, 1989/RE
L20 9 S E4

L4 ANSWER 1 OF 5 MEDLINE

TI Site-directed mutagenesis of monofunctional chorismate mutase engineered from the E. coli P-protein.

L4 ANSWER 2 OF 5 MEDLINE

TI Genetic aspects of aromatic amino acid biosynthesis in Lactococcus lactis.

L4 ANSWER 3 OF 5 MEDLINE

TI The pheA/tyrA/aroF region from Erwinia herbicola: an emerging comparative basis for analysis of gene organization and regulation in enteric bacteria.

L4 ANSWER 4 OF 5 MEDLINE

TI Loss of allosteric control but retention of the bifunctional catalytic competence of a fusion protein formed by excision of 260 base pairs from the 3' terminus of pheA from Erwinia herbicola.

L4 ANSWER 5 OF 5 MEDLINE

TI Cloning, sequencing, and expression of the P-protein gene (pheA) of Pseudomonas stutzeri in Escherichia coli: implications for evolutionary relationships in phenylalanine biosynthesis.

L13 ANSWER 1 OF 4 MEDLINE

AN 96422012 MEDLINE

TI Cloning, sequencing, and overexpression of the genes encoding coenzyme B12-dependent glycerol dehydratase of ***Citrobacter*** freundii.

AU Seyfried M; Daniel R; Gottschalk G

CS Institut fu

6/7/15DIALOG(R)File 351:DERWENT WPI(c)1998Derwent Info Ltd. All rts. reserv.

009727703 WPI Acc No: 94-007553/199401

Bacterial prod. for converting glycerol to 1,3-propanediol in high yield - derived from new anaerobic strains of Enterobacter, Corynebacterium or Citrobacter
Patent Assignee: INST NAT RECH AGRONOMIQUE (INRG); INRA INST NAT RECH AGRONOMIQUE (INRG)
Inventor: BORIES A; CLARET C
Number of Countries: 017 Number of Patents: 005

Patent Family:

Patent No Kind Date Applicat No Kind Date Main IPC Week

WO 9325696 A1 19931223 WO 93FR568 A 19930614 C12P-007/18 199401 B

FR 2692281 A1 19931217 FR 927212 A 19920615 C12P-021/00 199403

EP 648273 A1 19950419 EP 93913124 A 19930614 C12P-007/18 199520 WO 93FR568 A 19930614

EP 648273 B1 19960828 EP 93913124 A 19930614 C12P-007/18 199639 WO 93FR568 A 19930614

DE 69304332 E 19961002 DE 604332 A 19930614 C12P-007/18 199645 EP 93913124 A 19930614 WO

93FR568 A 19930614

Priority Applications (No Type Date): FR 927212 A 19920615

Cited Patents: 2.Jnl.Ref; EP 361082

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

WO 9325696 A1 F 34

FR 2692281 A1 25

EP 648273 A1 F Based on WO 9325696

EP 648273 B1 F 14 Based on WO 9325696

Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

DE 69304332 E Based on EP 648273

Based on WO 9325696

Abstract (Basic): WO 9325696 A

Bacterial products (A) which can convert glycerol (I) to 1,3-propanediol (II) are prep. by: (1) preculture of anaerobic populations, derived from anaerobic habitats, under anaerobic conditions on a buffered nutrient medium contg. (I) as sole carbon source; (2) isolating those precultures able to ferment (I); (3) enriching these precultures by discontinuous fermentation in an anaerobic reactor on (I)-based medium of controlled pH, and (4) isolating (A).

Also new are (A) themselves and the bacterial strains Enterobacter agglomerans CNCM I-1210 (most pref.); Clostridium butyricum I-1211 and Citrobacter amalonaticus I-1212.

USE/ADVANTAGE - (A) provide high yield conversion of (I) to (II) without significant by-product formation. (II) is used in synthesis of polyurethanes and polyesters; as an additive (esp. humectant) for foods and pharmaceuticals; in animal feeds; tobacco etc. (II) can now be produced from animal/plant waste materials, partic. by-products of alcohol distn.; avoiding the chemical synthesis from acrolein (which is toxic; derived from non-renewable resources and converted only with significant by-product formation). Dwg. 0/5

Abstract (Equivalent): EP 648273 B

Process for the production of products having bacterial activity and capable of converting glycerol into 1,3-propanediol, said process comprising the steps of (a) preculturing anaerobic populations, derived from anaerobic microbial habitats, said preculture being carried out under anaerobic conditions on a buffered nutrient medium containing glycerol as the sole carbon source, (b) isolating the active microbial precultures capable of fermenting glycerol, (c) enriching said precultures by discontinuous fermentation in an anaerobic reactor, on a nutrient medium based on glycerol as substrate and at controlled pH, (d) isolating the products having bacterial activity and capable of converting glycerol into 1,3-propanediol. Dwg. 0/4

Derwent Class: A41; B05; B07; D13; D16; D18; E17

International Patent Class (Main): C12P-007/18; C12P-021/00

International Patent Class (Additional): C12N-001/32; C12P-021/00; C12R-001-145; C12P-007/18; C12R-001-01

6/7/21DIALOG(R)File 351:DERWENT WPI(c)1998Derwent Info Ltd. All rts. reserv.

008799965 WPI Acc No: 91-303977/199142

Anaerobic microbial conversion of substrate to metabolite - is in airlift reactor with passage of inert gas

Patent Assignee: GES BIOTECHNOL GBF (GBFB); HENKEL KGAA (HENK)

Inventor: CARDUCK F J; DECKWER W D; GUNZEL B; KRETSCHMANN J; YONSEL S

Number of Countries: 015 Number of Patents: 002

Patent Family:

Patent No Kind Date Applicat No Kind Date Main IPC Week

DE 4010523 A 19911010 DE 4010523 A 19900402 199142 B

WO 9115590 A 19911017 199144

Priority Applications (No Type Date): DE 4010523 A 19900402

Cited Patents: DE 3039874; DE 3508274; EP 31258

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

WO 9115590 A

Designated States (National): JP US

Designated States (Regional): AT BE CH DE DK ES FR GB GR IT LI LU NL SE

Abstract (Basic): DE 4010523 A

In the microbial conversion of a substrate to a metabolite under anaerobic conditions in a fermenter, (a) the fermenter is a bubble-tube reactor with no mechanically moving inserts, and (b) a gas free from O₂ is pressed into the lower region of the reactor during the fermentation to convey the fermentation feed. O₂-free gases are the fermentation gases taken off at the head of the reactor, and/or inert gases, e.g. N₂, CO₂ or Ar. Rate of gas feed is 0.001-0.2 (0.03-0.07) vvm, fed centrally (pref. axially) to the bottom of the tower reactor through a pipe or a gasification ring. Reactor pref. has a ratio of height:dia. of 5:20-10, and may have static inserts promoting mixing, esp. recycling loops, which are central or on the walls and act as sepn. wall. Prods. and/or recycled culture medium is sprayed onto the foam, through a nozzle in the upper part of the reactor, to control foam. Microorganism is pref. Clostridium butyricum.

USE/ADVANTAGE - Useful for conversion of glycerol to propane 1,3-diol, using anaerobic micro-organisms.

Foaming is low, (almost) without use of an anti-foam. (4pp Dwg.No.0/0)

Derwent Class: D16; E17

International Patent Class (Additional): C07C-031/20; C12M-001/04; C12N-001/20; C12P-001/00; C12P-007/18; C12R-001/14

6/7/24DIALOG(R)File 351:DERWENT WPI(c)1998Derwent Info Ltd. All rts. reserv.

008299775 WPI Acc No: 90-186776/199025

Microbiological prepn. of 1,3-propane-diol - from glycerol and a sugar hydrogen-donor, under controlled addn. conditions

Patent Assignee: UNILEVER NV (UNIL); UNILEVER PLC (UNIL); UNILEVER PATENT HOLDINGS BV (UNIL)

Inventor: AVERHOFF B; GOTTSCHALK G

Number of Countries: 015 Number of Patents: 006

Patent Family:

Patent No Kind Date Applicat No Kind Date Main IPC Week

EP 373230 A 19900620 EP 88120718 A 19881212 199025 B

JP 2257885 A 19901018 JP 893212 A 19891211 199048

JP 92069997 B 19921109 JP 893212 A 19891211 C12P-007/18 199249

US 5164309 A 19921117 US 89448137 A 19891212 C12P-007/18 199249

EP 373230 B1 19930217 EP 88120718 A 19881212 C12P-007/18 199307

DE 3878564 G 19930325 DE 3878564 A 19881212 C12P-007/18 199313 EP 88120718 A 19881212

Priority Applications (No Type Date): EP 88120718 A 19881212

Cited Patents: 6.Jnl.Ref; DE 3336051

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

EP 373230 A

Designated States (Regional): AT BE CH DE ES FR GB GR IT LI LU NL SE

JP 92069997 B 7 Based on JP 2257885

US 5164309 A 7

EP 373230 B1 E 19

Designated States (Regional): AT BE CH DE ES FR GB GR IT LI LU NL SE

DE 3878564 G Based on EP 373230

Abstract (Basic): EP 373230 A

1,3-Propanediol (I) is prep. microbiologically from glycerol (II) and an H-donor (III) as follows: (a) biomass is formed from a growth phase from the selected bacterial strain (IV) accompanied by feeding with (II) and (if necessary) excluding (III) until a stationary growth phase; and (b) more (II) and (III) matched to the biomass are added to the stationary cell suspension formed; accompanied by increased (I) formation.

ADVANTAGE - The simple, economic, rapid and continuous method affords 1,3-propanediol from glycerol in high yield without the formation of environmentally undesirable by-prods. Dwg. 0/4

Abstract (Equivalent): EP 373230 B

Process for the microbiological preparation of 1,3-propane diol from glycerol in growth media of suitable bacterial strains, accompanied by the addition of a cosubstrate in the form of an H-donor and separation of the 1,3-propanediol formed, characterised in that (a) a biomass is formed by culturing the selected bacterial strain in the growth phase in a growth medium containing glycerol, but with the substantial exclusion of any H-donor; (b) the bacterial cells are transferred to a stationary phase and biotransformation is effected by adding fruther glycerol and an H-donor matched to the biomass, accompanied by increased 1,3-propane diol formation, this being the main stage of its preparation.

Abstract (Equivalent): US 5164309 A

1,3-Propanediol is prep. by cultivating a bacterial strain in a glycerol-contg. growth medium and isolating the prod. formed. Process comprises (a) forming a biomass by culturing strain of genus Citrobacter in the medium with exclusion of any H-donor, (b) permitting cells to reach a stationary cell phase, (c) adding additional glycerol and sugar as H-donor to the biomass, while keeping cells in stationary phase; then (d) isolating the prod..

ADVANTAGE - High yields are obtd. in continuous or batchwise process with small amt. of unobjectionable by-prods.

(Dwg. 0/4)

Derwent Class: D16; E17

International Patent Class (Main): C12P-007/18

International Patent Class (Additional): C12R-001/01; C12P-007/18; C12R-001-01

6/7/25DIALOG(R)File 351:DERWENT WPI(c)1998Derwent Info Ltd. All rts. reserv.

008213719

WPI Acc No: 90-100720/199014

1,3-Propane diol prodn. by fermentation of aq. glycerine soln. - with selected microorganism, then removal of biomass and distn. of prod.

Patent Assignee: GES BIOTECH FORCHUNG (GBFG); GES BIOTECH FORSCH GMBH (GBFB); HENKEL

KGAA (HENK); GBF GES BIOTECH FORSCHUNG GMBH (GBFB)

Inventor: BIEBL H; CARDUCK F J; DECKWER P; KRETSCHMANN J; TAG C; CARDUCK F; DECKWER W;

KRETSCHMANN J

Number of Countries: 012 Number of Patents: 004

Patent Family:

Patent No Kind Date Applicat No Kind Date Main IPC Week

EP 361082 A 19900404 EP 89115555 A 19890823 199014 B

DK 8904231 A 19900302 199022

DE 3924423 A 19910131 DE 3924423 A 19890724 199106

US 5254467 A 19931019 US 89402209 A 19890901 C12P-007/04 199343 US 91691648 A 19910425

Priority Applications (No Type Date): DE 3924423 A 19890724; DE 3829618 A 19880901

Cited Patents: 5.Jnl.Ref; A3..9138; No-SR.Pub

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

EP 361082 A G 16

Designated States (Regional): AT BE CH DE ES FR GB IT LI NL

US 5254467 A 8 CIP of US 89402209

Abstract (Basic): EP 361082 A

Process for conversion of glycerine into 1,3-propanediol by microorganisms using a strain of microorganisms selected from clostridium, Enterobacterium, Lactobacillus, Citrobacter, Aerobacter and Klebsiella which is capable of converting glycerine into 1,3-propanediol in a space time yield of more than 0.5 g per hr. per l in a 5 wt% glycerine soln. as sole carbon source under standard fermentation conditions, comprises using the chosen microorganism for conversion of a 5-20 wt%, (10-15 wt%) soln. of glycerine as sole carbon source under anaerobic conditions while maintaining a constant pH, and after extensive conversion of the glycerine, sepg. obtd. biomass and working up the prod. mixt. by distn.

USE/ADVANTAGE - Used for technical scale use, esp. for prodn. Of 1,3-propanediol from glycerine waters obtd. from the industrial processing of triglycerides, esp. glycerine solns. from the saponification and/or transesterification of fats without post-treatment of the glycerine-water phase. 0/0

Abstract (Equivalent): US 5254467 A

Transformation of glycerol into 1,3-propanediol by microorganisms comprises fermenting, under standard anaerobic fermentation conditions and constant pH, a strain selected from clostridium butyrium SH1 (DSM 5431) and clostridium butyrium AK1 (DSM 5430) and mutants in a medium comprising aq. glycerol soln. contg. 5-20 wt.% glycerol to produce a biomass and 1,3-propanediol soln. in a vol./time yield to more than 2.2g.hr-IE-1.a, and sepg. 1,3-propanediol from the biomass. The glycerol soln. is a triglyceride processing stream from the saponification of fats having a low lauric acid content. The soln. pref. comprises 10-15 wt.% glycerol, the pH is maintained at 6.5-8 and the temp. is pref. 27-40 deg. C. The inoculum is pref. 5-20 vol.%.

USE/ADVANTAGE - The fermentation is easy to handle on an industrial scale and is capable of converting high concns. of glycerol into propanediol under standard fermentation conditions with a vol./time yield of more than 0.5 g hr-IE-1 with the expected catadolic repression which is normally encountered with media accumulating high propanediol concns. Dwg. 0/0

Derwent Class: D16; E17

International Patent Class (Main): C12P-007/04

International Patent Class (Additional): C12P-007/18; C12R-001/145

6/7/26DIALOG(R)File 351:DERWENT WPI(c)1998Derwent Info Ltd. All rts. reserv.

008197141

WPI Acc No: 90-084142/199012

Conversion of glycerol to propane 1,3-diol - by fermentation using glycerol as sole source of carbon
 Patent Assignee: GBF GES BIOTECHN FORSCH (GBFB); HENKEL KGAA (HENK); GBF GES BIOTECH FORSCHUNG GMBH (GBFB)

Inventor: CARDUCK E J; DECKWER W D; KRETSCHMAN J; TAG C; BIEBL H; CARDUCK F; DECKWER W; KRETSCHMAN J

Number of Countries: 003 Number of Patents: 003

Patent Family:

Patent No Kind Date Applicant No Kind Date Main IPC Week

DE 3829618 A 19900315 DE 3829618 A 19880901 199012 B

JP 3065192 A 19910320 JP 89228160 A 19890901 199118

US 5254467 A 19931019 US 89402209 A 19890901 C12P-007/04 199343 US 91691648 A 19910425

Priority Applications (No Type Date): DE 3829618 A 19880901; DE 3924423 A 19890724

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent

DE 3829618 A 7

US 5254467 A 8 CIP of US 89402209

Abstract (Basic): DE 3829618 A

Glycerol is converted to 1,3-propanediol by using a strain of *Clostridium*, *Enterobacterium*, *Lactobacillus*, *Bacillus*, *Citrobacter*, *Aerobacter*, or *Klebsiella*, which, under standard fermentation conditions, converts a 5% glycerol soln. as sole C source to 1,3-propanediol at a space-time yield of more than 0.5 g/h/l. These are used for the technical conversion of 5-20% glycerol solns., as sole C source, under anaerobic conditions and at constant pH. After consumption of the glycerol, the biomass is sep'd., and the prod. mixt. is processed by distn. USE/ADVANTAGE - Esp. that obtd. in processing triglycerides (claimed). Other useful prods. may be obtd. in addn. to propane diol, e.g. 2,3-butane diol, ethanol, acetoin, acetic acid and/or lactic acid. Glycerol solns. of concn. up to 20 wt.% can be used. The solns. need not be pure. 0/0

Abstract (Equivalent): US 5254467 A

Transformation of glycerol into 1,3-propanediol by microorganisms comprises fermenting, under standard anaerobic fermentation conditions and constant pH, a strain selected from *Clostridium butyrium* SH1 (DSM 5431) and *Clostridium butyrium* AK1 (DSM 5430) and mutants in a medium comprising aq. glycerol soln. contg. 5-20 wt.% glycerol to produce a biomass and 1,3-propanediol soln. in a vol./time yield to more than 2.2g.hr⁻¹E-1.a, and sepg. 1,3-propanediol from the biomass. The glycerol soln. is a triglyceride processing stream from the saponification of fats having a low lauric acid content. The soln. pref. comprises 10-15 wt.% glycerol, the pH is maintained at 6.5-8 and the temp. is pref. 27-40 deg. C. The inoculum is pref. 5-20 vol.%.

USE/ADVANTAGE - The fermentation is easy to handle on an industrial scale and is capable of converting high concns. of glycerol into propanediol under standard fermentation conditions with a vol./time yield of more than 0.5 g hr⁻¹E-1 with the expected catadolic repression which is normally encountered with media accumulating high propanediol concns. Dwg.0/0

Derwent Class: D16: E17

International Patent Class (Main): C12P-007/04

International Patent Class (Additional): C07C-031/20; C12P-007/18; C12R-001/145

10/TI/1DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Fermentative prodn. of 1,3-propanediol useful for polymer prodn. - from carbon substrates using mixed culture of glycerol-producing and diol-producing organisms

10/TI/2DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Conversion of glycerol to propane 1,3-diol - by fermentation using glycerol as sole source of carbon

12/TI/1 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Immersion sterilisation using an organic chemical sterilant - used for immersion sterilisation of medical and dental instruments and is effective against microorganisms including bacterial spores.

12/TI/2DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Composition used as industrial antifungal and antiseptic agent - contains 2-thio-cyano-pyridine-1 oxide and e.g. 2,2-dibromo-2-nitro-ethanol

12/TI/3DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

New (S)-1-Phenyl- 1, 3- propane- diol-producing enzyme and its prepn. - comprises culturing *Hansenula* genus in culture medium and sepg. enzyme, used in prepn. of pharmaceuticals

12/TI/4DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Industrial microbicide for sterilisation - contains 2,2-dibromo-2-nitro-ethanol, 2-bromo-2-nitro- 1, 3- propane- diol and methylene-bis-thiocyanate

12/TI/5DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Polyester prepn. for industrially utilisable copolymer selective and easy mfr. - bypreculturing poly-3-hydroxy butyrate for *Pseudomonas*, and post culturing for mfg. polyester and accumulating in cells

12/TI/6DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Additive for toilet cleaner used on passenger train - contains chlorhexidine gluconate, 2-bromo- 2-nitro 1, 3- propane- diol, sodium nitrite, glyoxal, microorganism culture mixt., etc

12/TI/7DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Crude garbage-deodorising liq - comprises liq aldehyde, 2-bromo-2-nitro- 1, 3- propane- diol, deodorisers, supernatant from centrifuged culture soln of microorganism.

12/TI/8DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

S)-1-phenyl- 1, 3- propanediol prepn. having high optical purity - using enantiomer mixt. of 1-phenyl- 1, 3- propane diol and microorganism e.g. *Bacillus*, *Brevibacterium*, *Pseudomonas* etc.

12/TI/9DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Additive for flush water of toilet installed in a train - comprises liq. aldehyde, 2-bromo-2-nitro- 1, 3- propane diol and supernatant aq. culture medium of microorganism e.g. *Bacillus* and deodorising materials preventing malodours

12/TI/10DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Non-aq. hypo compatible biodegradable cold chemical sterilant - comprises monohydric alcohol, polyhydric alcohol, dialdehyde and a cationic surface active agent

12/TI/11DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of (R)- 1, 3- propane diol - by introducing microbe e.g. *Candida* sp. into culture to reduce 1-phenyl propane 3-ol-1-one

12/TI/12DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

New carbocyclic derivs. exhibiting biocidal agents - e.g. 2-(((4-(2-(methoxy)ethoxy) 1-(anthracenyl)methyl) amino)-2-methyl- 1,3-propanediol is esp. useful as antitumour agent

12/TI/13DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Agent for biologically treating raw sewage in aeroplane - contains conc. soln. of incubated bacteria, diol cpd., dye, perfume and magnesium sulphate, used in water-circulating type toilet

12/TI/14DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of optically active 3-phenyl-3-propanol used as pharmaceutical intermediates - by contacting culture liqor, microbe of treated prod. of microbe body with racemic 3-phenyl-3-propanol to increase ratio of S-isomer

12/TI/15DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of optically active 1-phenyl- 1, 3-propanediol (deriv.) - by hydrolysis of corresp. ester enantiomeric mixt. using hydrolase enzyme e.g. *Pseudomonas* lipase, giving cpd. useful as drug intermediates

12/TI/16DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Deodorising preservative bead agent, having durable effect - uses beads made by dropping microorganism and nutrients onto aq. soln. of potassium chloride or calcium chloride, with preservatives

12/TI/17DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Aq. soln. for disinfecting soft contact lenses - comprises 2-amino-2-hydroxymethyl- 1, 3- propane- diol and EDTA and is effective against *Serratia marcescens* and *Candida albicans*

12/TI/18DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Optical active 1-phenyl- 1, 3-propanediol(s) - obtd. by contacting racemic mixt. with culture liq. and microbe body to increase proportion of S- cpd

12/TI/19DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of optically active 3-phenyl-1,3-propan-diol - by treating 3-phenyl 1,3-propan-diol-enantiomer with microorganism e.g. belonging to genus *Candida*

12/TI/20DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Optically active 1-phenyl- 1, 3- propane-diol prepn. - by culture of suitable microorganism in presence of racemic diol, used as drug intermediate

12/TI/21DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Prepn. of optically active 1,3-butanediol - using microbe able to digest asymmetrically enantiomer mixt. in presence of alcohol or ketol

12/TI/22DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Antimicrobial compsn. for industrial application - comprises 4,5-dichloro-N-N-octylisothiazolin-3-one and bromonitroalcohol(s)

12/TI/23DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Candida rugosa lipase and isoenzyme(s) - used for stereoselectively hydrolysing ester(s), transesterifying ester(s) or acid(s), or esterifying acid(s) or alcohol(s)

12/TI/24DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Biocidal additives for metal-working fluids - contg. 2-amino-1-nitrophenyl-13-propanediol and tetramethyl-thiuram disulphide

12/TI/25DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Compsn. contg. 2-((6-chrysenylmethyl) amino)-2-methyl- 1, 3-propanediol - for oral or parenteral use esp. as an anti-tumour agent

12/TI/26DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Pharmaceutical formulation e.g. for treating tumours - contains N-alkylated phenanthrenylmethyl amine cpd. e.g. 2-methyl 2-((3-phenanthrenylmethyl) amino) 1, 3- propane diol

12/TI/27DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

New chrysene derivs. - are active against viruses, fungi, protozoa, bacteria, helminths and tumour cells

12/TI/28DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

2-Bromo-2-bromomethyl glutaronitrile in synergistic mixts. - for control of microbial growth

12/TI/29DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Synergistic combination of prochloraz and bronopol - in compsn. for control of bacteria and fungi which attack wood and crops

12/TI/30DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Keto-alkyl-phospholipid(s) - are antitumour agents, platelet activating factor antagonists and antifungal agents

12/TI/31DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Antibiotic for water system e.g. paper mill - contains 2-bromo-2-nitro 1, 3- propane- diol and 1,4-bis (bromoacetoxy)-2-butene

12/TI/32DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

D(-)-beta-hydroxyisobutyric acid prepn. - by reacting isobutyl alcohol with a specific microorganism

12/TI/33DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Antimicrobial 1,3-diformoxy-2-bromo-2-nitro-propane - prepd. by esterification of bromonitropropane with formic acid mixed anhydride using basic catalyst

12/TI/34DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Microbial mycelium prodn. - by culturing microorganism of *Bacillus* genus able to digest ethanol and 2,3-butane diol

12/TI/35DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Phenyl-trifluoroacetamido-propanediol derivs. - for use as broad spectrum antibacterial agents

12/TI/36DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.

Mono-hydroxy-carboxylic acid prepn. - by culture of genus *Bacillus* in medium contg. (1,2)- or (1,3)-propane diol

12/TI/37 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.
Fluorothiamphenicol and its glycol ester - with broad-spectrum antibacterial activity

12/TI/38 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.
Liquid enzyme product - contg protease or amylase in selected liquid carrier

12/TI/39 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.
Cinnamoylphenyl-1,3-propanediols

12/TI/40 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.
1-p-acetylphenyl-2,2-dichloroacetamido-1,3-propane diols antibiotics - s af 65 4887 provided

12/TI/41 DIALOG(R)File 351:(c)1998 Derwent Info Ltd. All rts. reserv.
N-trichloromethylthio-derivs of antibiotics

12/7/11 DIALOG(R)File 351:DERWENT WPI (c)1998 Derwent Info Ltd. All rts. reserv.
009614795 WPI Acc No: 93-308343/199339
Prepn. of (R)- 1, 3- propane diol - by introducing microbe e.g. *Candida* sp. into culture to reduce 1-phenylpropane 3-ol-1-one Patent Assignee: AJINOMOTO KK (AJIN)
Number of Countries: 001 Number of Patents: 001

Patent Family:
Patent No Kind Date Applicat No Kind Date Main IPC Week
JP 5219984 A 19930831 JP 9222466 A 19920207 C12P-04/1/00 199339 B
Priority Applications (No Type Date): JP 9222466 A 19920207
Patent Details:
Patent Kind Lan Pg Filing Notes Application Patent
JP 5219984 A 4

Abstract (Basic): JP 5219984 A
A culture, microbial cells sepd. from the culture or the cell treated substance that can asymmetrically reduce 1-phenylpropane 3-ol-1-one to (R)-1-phenyl-1,3-propanediol, is reacted on 1-phenylpropane 3-ol-1-one, then produced (R)-1-phenyl-1,3-propanediol is collected. More specifically, the microbe is *Candida* sp., *Trichosporon* sp., or *Aspergillus* sp.

USE/ADVANTAGE - High optical purity (R)-1-phenyl-1,3-propanediol can be prepd in high yield.
In an example, each 3 ml of medium (glucose 2.0%, (NH₄)₂SO₄ 0.5%, K₂HPO₄ 0.3%, KH₂PO₄ 0.1%, MgSO₄·7H₂O 0.05%, FeSO₄·7H₂O 0.001%, MnSO₄·4H₂O 0.001%, yeast extract 1.0%, polypeptone 1.0%; pH 7.0) was charged into a test tube. After heat sterilisation, one loop of microbial cells were inoculated, and shaking cultured at 30degC for 24 - 48 hours. To the culturing soln., 3 mg 1-phenyl-1-propane-3-ol-1-one and 15 mg glucose were added, and cultured at 30degC for more 24 hours. After the reaction, the soln. was diluted with ethanol, and centrifuged. The supernatant was analysed. Yield (%), absolute configuration and optical purity (% e.e) were 6.0, R, 86 (*Trichosporon fermentans* IFO 1199) Dwg.0/0
Derwent Class: B05; D16; E14
International Patent Class (Main): C12P-04/1/00
International Patent Class (Additional): C12P-04/1/00; C12R-001-72; C12R-001-69; C12R-001-645

12/7/21 DIALOG(R)File 351:DERWENT WPI(c)1998 Derwent Info Ltd. All rts. reserv.
008847126 WPI Acc No: 91-351143/199148

Prepn. of optically active 1,3-butanediol - using microbe able to digest asymmetrically enantiomer mixt. in presence of alcohol or ketol

Patent Assignee: DAICEL CHEM IND LTD (DAI.)
Number of Countries: 001 Number of Patents: 001

Patent Family:
Patent No Kind Date Applicat No Kind Date Main IPC Week
JP 3236795 A 19911022 JP 9034249 A 19900215 199148 B
Priority Applications (No Type Date): JP 9034249 A 19900215
Abstract (Basic): JP 3236795 A

In the prepn. of optically active 1,3-butanediol (I), a microbe able to digest asymmetrically an enantiomer mixt. of (I) is reacted with the mixt. to collect the remaining optically active (I). A microbe is used having an increased ability of digesting asymmetrically the mixt. in the presence of an alcohol or a ketol, the alcohol being pref. ethanol, ethylene glycol, 1-propanol, 2-propanol, trimethylene glycol, 1,3-butanediol, 1,4-butanediol, 3-methyl-1,3-butanediol, or 1,5-pentanediol and the ketol being pref. 4-hydroxy-2-butanone or dihydroxyacetone.

USE/ADVANTAGE - The method gives a high reaction rate to improve productivity.
In an example, *Candida parapsilosis* IFO 1396 is inoculated into 25 ml of a medium contg. 2% glucose and 1% yeast extract and cultured at 30 deg. C for 24 hrs.. The bacteria body is centrifuged and washed with physiological saline soln. to give live bacteria body. 25ml of 0.1 mol K phosphate buffer is added and 0.125 g of an alcohol or a ketol is added to the suspension and the mixt. is shaken at 30 C for 5 hrs. and centrifuged and the bacteria body is washed with physiological saline soln.. 25 ml distilled water is added to it and 0.75 g racemic (I) and 0.125 g CaCO₃ are added and reacted at 30 deg. C for 24 hrs.. Then, the mixt. is centrifuged and the supernatant is satd. with NaCl and extracted with 50 ml ethyl acetate. The extract is dried on anhydrous Na₂SO₄ and evacuated in vacuo to give a syrup. It is acetylated with acetyl chloride and dissolved in hexane and the optical purity is determined by HPLC. (4pp Dwg.No.0/0)ne.
Derwent Class: B05; D16; E17
International Patent Class (Additional): C12P-04/1/00; C12R-001/72

12/7/23 DIALOG(R)File 351:DERWENT WPI(c)1998 Derwent Info Ltd. All rts. reserv.
008503132 WPI Acc No: 91-007216/199101

Candida rugosa lipase and isoenzyme(s) - used for stereoselectively hydrolysing ester(s), transesterifying ester(s) or acid(s), or esterifying acid(s) or alcohol(s)

Patent Assignee: RHONE-POULENC INC (RHON); RHONE-POULENC RORER INT HOLDIN (RHON); RHONE-POULENC INC (RHON)

Inventor: BARTON M J; CALTON G J; COBBS C S; GOSWAMI A; HAMMAN J P; MALICK A P; PENG L
Number of Countries: 023 Number of Patents: 010

Patent Family:
Patent No Kind Date Applicat No Kind Date Main IPC Week
WO 9015146 A 19901213 199101 B
EP 407033 A 19910109 EP 90306098 A 19900605 199102
PT 94253 A 19910208 199109
AU 9058242 A 19910107 199115
ZA 9004121 A 19910529 ZA 904121 A 19900529 199125
US 5108916 A 19920428 US 89361049 A 19890605 199220
HU 61050 T 19921130 HU 904853 A 19900601 C12P-007/64 199302 WO 90US2990 A 19900601
JP 5500452 W 19930204 JP 90508806 A 19900601 C12P-04/1/00 199310 WO 90US2990 A 19900601

AU 637113 B 19930520 AU 9058242 A 19900601 C12N-009/20 199327
IL 94545 A 19940530 IL 94545 A 19940530 C12N-009/18 199424
Priority Applications (No Type Date): US 89361049 A 19890605
Cited Patents: NoSR.Pub; 2.Jnl.Ref; JP 64060392; US 4472503; US 4601987; US 4650755; US 4818695; US 4873194; US 4897357; US 4923810

Patent Details:

Patent Kind Lan Pg Filing Notes Application Patent
WO 9015146 A

Designated States (National): AU CA HU JP KR SU

EP 407033 A

Designated States (Regional): AT BE CH DE ES FR GB GR IT LI LU NL SE
US 5108916 A 37

HU 61050 T Based on WO 9015146

JP 5500452 W 40 Based on WO 9015146

AU 637113 B AU 9058242

Based on WO 9015146

Abstract (Basic): WO 9015146 A

Process for stereoselectively hydrolysing racemic mixts. of esters of 2-substd. acids other than 2-halo propionic acids, at high enantiomeric excess, into acids comprises contacting the racemic mixt. with a lipase of *Candida rugosa* (CR) in the presence of an organic solvent, e.g. toluene; the lipase may be immobilised using a polyaziridine opt. in the presence of an organic acid, e.g. stearic acid; pref. the process is carried out in the presence of a reducing agent, e.g. sodium hydrosulphite, sodium sulphite or a borohydride. Pref. the enzymes of the lipase of CR are purified by immobilisation, by isoelectric focussing or using ion exchange chromatography and sepp. the resulting lipase isoenzymes with an appropriate elution scheme; the chromatography support may be e.g. a sulphopropyl derivatised polymer of N-acrylyl amin-2-amino 2-hydroxy-1,3-propanediol, a sulphopropyl derivatised cross linked dextran with methylene bisacrylamide polymer or a sulphopropyl derivatised agarose; a lipase isoenzyme having an N terminal amino acid sequence: Ala-Pro-Thr-Ala-U-Leu-Ala-Asn-Gly-V-Thr-Ile-Thr-Gly-Leu-Asn-Ala-Ile-Ile-Asn-Gluw-Ala-Phe-Leu-Gly-Ile-WW-X-Ala-Glu-Pro-Proe-Y-Z-Asn-P (U, V, W, X, Y, Z are amino acids and P is the remaining portion of the peptide; is specifically claimed.

USE/ADVANTAGE - The processes are used to improve enzymatic hydrolysis, esterification and transesterification procedures. They can be used for increasing the rate or stereoselectivity of a lipase mediated reaction. The methods can be used for purifying, sepp. and increasing the stability of the enzymes or the 2 new isoenzymes isolated. The processes are used esp. for the stereoselective prodn. of S-ketoprofen, S-ibuprofen, S-fenoprofen, S-2-phenylpropionic acid and S-indoprofen. (141pp Dwg.No.0/0)

Abstract (Equivalent): US 5108916 A

Process for the stereospecific hydrolysis of esters of 2-substd. alkanolic acids (excluding 2-halo propionic esters), transesterification of esters or acids, and/or the esterification of acids or alcohols comprises treatment of the racemic mixt., ester, acid or alcohol with an immobilised isoenzyme of lipase MY or AY (obtd. from *Candida rugosa*) in an organic solvent.

ADVANTAGE - The process is conducted under very mild conditions but gives high yields (e.g. 94%) of enantiomeric prod

Derwent Class: B04; B05; D16; E19

International Patent Class (Main): C12N-009/18; C12N-009/20; C12P-007/64; C12P-04/1/00

International Patent Class (Additional): C12N-011/08; C12N-011/18; C12P-007/12; C12P-007/62

16jun98 08:28:02 User208600 Session D1155.3

SYSTEM:OS - DIALOG OneSearch

File 155:MEDLINE(R) 1966-1998/Aug W1 (c) format only 1998 Dialog Corporation

File 5:BIOSIS PREVIEWS(R) 1969-1998/JUN W2 (c) 1998 BIOSIS

Set Items Description

S1 0 PN=3829618

S2 0 IN=KRETSCHMANN, J?

S3 0 AU=KRETSCHMANN,?

S4 0 PN=DE 3829618

S5 0 CN=504-63-2

S6 0 CN=R01300-P

S7 185850 ASPERGILLUS OR SACCHAROMYCES OR ZYGOSACCHAROMYCES OR PICHIA OR KLUYVEROMYCES OR CANDIDA OR HANSENULA OR DEBARYOMYCES OR MUCOR

S8 282056 TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR

BACILLUS OR STREPTOMYCES OR PSEUDOMONAS

S9 456125 S7 OR S8

S10 0 S6 AND S9

S11 620 TRIMETHYLENE(W)GLYCOL OR 1(W)3(W)(PROPANEDIOL OR PROPANE (N)DIOL)

S12 28 S11 AND S9 NOT S10

S13 28 ID (sorted in duplicate order)

13/6/1 (Item 1 from file: 155) 09425271 98100451

Carcinogenic activity of the flame retardant, 2,2-bis(bromomethyl)- 1, 3- propanediol in rodents, and comparison with the carcinogenicity of other NTP brominated chemicals.

13/6/2 (Item 2 from file: 5) 14101291 BIOSIS Number: 01101291

Carcinogenic activity of the flame retardant, 2,2-bis(bromomethyl)- 1, 3- propanediol in rodents, and comparison with the carcinogenicity of other NTP brominated chemicals Print Number: Biological Abstracts Vol. 105 Iss. 005 Ref. 073566

13/6/3 (Item 3 from file: 155) 03200243 75109256

Diol lipids of rat liver. Quantitation and structural characteristics of neutral lipids and phospholipids derived from ethanediol, propanediols, and butanediols.

13/6/4 (Item 4 from file: 155) 05274092 87223002

Effect of buffers on testing of *Candida* species susceptibility to flucytosine.

13/6/5 (Item 5 from file: 5) 5880069 BIOSIS Number: 84012634

EFFECT OF BUFFERS ON TESTING OF CANDIDA SPECIES SUSCEPTIBILITY TO FLUCYTOSINE

13/6/6 (Item 6 from file: 5)4854284 BIOSIS Number: 79096599
EFFECT OF 1-P NITROPHENYL-2-AMINO- 1,3-PROPANEDIOL AND 1,3-BISCHLOROETHYLPHOSPHONIC-ACID DERIVATIVES ON THE GROWTH OF ENTEROBACTERIA

13/6/7 (Item 7 from file: 5)9533630 BIOSIS Number: 94038630
ENANTIOSELECTIVE TRANSESTERIFICATION OF 2 METHYL- 1,3-PROPANEDIOL DERIVATIVES CATALYZED BY PSEUDOMONAS-FLUORESCENS LIPASE IN AN ORGANIC SOLVENT

13/6/8 (Item 8 from file: 5)11126908 BIOSIS Number: 97326908
Enzymatic esterification of diols in reverse micellar media Print Number: Biological Abstracts Vol. 098 Iss. 003 Ref. 033420

13/6/9 (Item 9 from file: 5)8675663 BIOSIS Number: 92140663
ESTERIFICATION OF GLYCOSIDES WITH GLYCEROL AND TRIMETHYLOPROPANE MOIETIES BY CANDIDA-CYLINDRACEA LIPASE

13/6/10 (Item 10 from file: 155)03768199 81134198
Esterification of terminal phosphate groups in nucleic acids with sorbitol and its application to the isolation of terminal polynucleotide fragments.

13/6/11 (Item 11 from file: 155)07565077 93300800
Formation of 1,3-cyclic glycerophosphate by the action of phospholipase C on phosphatidylglycerol.

13/6/12 (Item 12 from file: 5)10468669 BIOSIS Number: 96068669
FORMATION OF 1,3 CYCLIC GLYCEROPHOSPHATE BY THE ACTION OF PHOSPHOLIPASE C ON PHOSPHATIDYLGLYCEROL

13/6/13 (Item 13 from file: 155)04870897 86059296
Inhibition of glucoamylases from a Rhizopus sp. and Aspergillus saitoi by aminoalcohol derivatives.

13/6/14 (Item 14 from file: 5)5240637 BIOSIS Number: 81007944
INHIBITION OF GLUCOAMYLASES FROM A RHIZOPUS-SP AND ASPERGILLUS-SAITOBY AMINO ALCOHOL DERIVATIVES

13/6/15 (Item 15 from file: 155)04677524 85184658
Isolation and characterization of Streptomyces venezuelae mutants blocked in chloramphenicol biosynthesis.

13/6/16 (Item 16 from file: 5)4856415 BIOSIS Number: 79098730
ISOLATION AND CHARACTERIZATION OF STREPTOMYCES-VENEZUELAE MUTANTS BLOCKED IN CHLORAMPHENICOL BIOSYNTHESIS

13/6/17 (Item 17 from file: 5)7759118 BIOSIS Number: 90127118
LIPASE-CATALYZED RESOLUTION OF RS-2 METHYL-4-PHENYLSELENO-1-BUTANOL SYNTHESIS OF ENANTIOMERICALLY PURE 2 METHYL- 1,3-PROPANEDIOL DERIVATIVES

13/6/18 (Item 18 from file: 5)13751548 BIOSIS Number: 99751548
Lipase catalysed synthesis of propanediol monoesters in biphasic aqueous medium Print Number: Biological Abstracts Vol. 104 Iss. 009 Ref. 126329

13/6/19 (Item 19 from file: 5)10095781 BIOSIS Number: 95095781
MARKED DEPENDENCE OF ENZYME PROCHIRAL SELECTIVITY ON THE SOLVENT

13/6/20 (Item 20 from file: 155)09443094 98157761
Metabolic engineering of propanediol pathways.

13/6/21 (Item 21 from file: 5)14134511 BIOSIS Number: 01134511
Metabolic engineering of propanediol pathways Print Number: Biological Abstracts Vol. 105 Iss. 007 Ref. 093385

13/6/22 (Item 22 from file: 5)8615325 BIOSIS Number: 92080325
PURIFICATION AND SOME PROPERTIES OF THE ENZYME CATALYZING THE C-GAMMA-ELIMINATION OF A DIARYLPROPANE-TYPE LIGNIN MODEL FROM PSEUDOMONAS PAUCIMOBILIS TMY 1009

13/6/23 (Item 23 from file: 5)5422009 BIOSIS Number: 82068612
REGULATION OF FORMALDEHYDE OXIDATION BY THE METHANOL DEHYDROGENASE MODIFIER PROTEINS OF METHYLOPHILUS METHYLOTROPHUS AND PSEUDOMONAS AM-1

13/6/24 (Item 24 from file: 5) 13317312 BIOSIS Number: 99317312
Selective monoacetylation of diol compounds by Aspergillus niger lipase Print Number: Biological Abstracts Vol. 103 Iss. 002 Ref. 020426

13/6/25 (Item 25 from file: 5)13317084 BIOSIS Number: 99317084
Solvent polarity influences product selectivity of lipase-mediated esterification reactions in microaqueous media Print Number: Biological Abstracts Vol. 103 Iss. 002 Ref. 020198

13/6/26 (Item 26 from file: 155)02717237 80065688
Synthesis of various kinds of esters by four microbial lipases.

13/6/27 (Item 27 from file: 5) 2999342 BIOSIS Number: 69036749
SYNTHESIS OF VARIOUS KINDS OF ESTERS BY 4 MICROBIAL LIPASES

13/6/28 (Item 28 from file: 5)4838404 BIOSIS Number: 79080719
SYNTHESIS OF ESTER OLIGOMER BY ASPERGILLUS-NIGER LIPASE

13/8/20 (Item 20 from file: 155)DIALOG(R)File 155:(c) format only 1998 Dialog Corporation. All rights reserved. 09443094 98157761
Metabolic engineering of propanediol pathways.
Tags: Support, Non-U.S. Gov't; Support, U.S. Gov't, Non-P.H.S.; Support, U.S. Gov't, P.H.S.
Descriptors: *Biotechnology; *Carbohydrates--Metabolism--ME; *Genetic Engineering; *Propylene Glycol--Metabolism--ME; *Propylene Glycols--Metabolism--ME; Escherichia coli--Genetics--GE; Escherichia coli--Metabolism--ME; Fermentation; Klebsiella pneumoniae--Genetics--GE; Klebsiella pneumoniae--Metabolism--ME
CAS Registry No.: 0 (Carbohydrates); 0 (Propylene Glycols); 504-63-2 (1,3-propanediol); 57-55-6 (Propylene Glycol)

13/8/21 (Item 21 from file: 5)DIALOG(R)File 155:(c) 1998 BIOSIS. All rights reserved.

14134511 BIOSIS Number: 01134511
Metabolic engineering of propanediol pathways
Print Number: Biological Abstracts Vol. 105 Iss. 007 Ref. 093385
Descriptors/Keywords: LITERATURE REVIEW; KLEBSIELLA PNEUMONIAE; SACCHAROMYCES CEREVISIAE; THERMOANAEROBACTERIUM THERMOSACCHAROLYTICUM; BACTERIA; MICROORGANISM; FUNGUS; BIOTECHNOLOGY; BIOPROCESS ENGINEERING; METABOLISM; FERMENTATION PROCESSES; METABOLIC ENGINEERING; PROPANEDIOL PATHWAYS; PROPANEDIOL; SUGARS; SUGAR CONVERSIONS; ENZYMES; PRODUCT RECOVERY
Concept Codes:

*03502 Genetics and Cytogenetics-General
*10010 Comparative Biochemistry, General
*10050 Biochemical Methods-General
*10060 Biochemical Studies-General
*10064 Biochemical Studies-Proteins, Peptides and Amino Acids
*10068 Biochemical Studies-Carbohydrates
*10506 Biophysics-Molecular Properties and Macromolecules
*10804 Enzymes-Methods
*13002 Metabolism-General Metabolism; Metabolic Pathways
*13003 Metabolism-Energy and Respiratory Metabolism
*13004 Metabolism-Carbohydrates
*29500 Microorganisms, General
*31000 Physiology and Biochemistry of Bacteria
*39007 Food and Industrial Microbiology-Biosynthesis, Bioassay and Fermentation
*51519 Plant Physiology, Biochemistry and Biophysics-Metabolism
Biosystematic Codes:
05000 Bacteria-General Unspecified (1992-)
06702 Enterobacteriaceae (1992-)
15100 Ascomycetes
Super Taxa:
Microorganisms; Bacteria; Eubacteria; Plants; Nonvascular Plants; Fungi

16jun98 08:32:18 User208600 Session D1155.4

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec (c) 1998 Inst for Sci Info

Set Items Description

S1 0 PN=3829618
S2 0 IN=KRETSCHMANN, J?
S3 0 AU=KRETSCHMANN, J?
S4 0 PN= DE 3829618
S5 0 CN=504-63-2
S6 0 CN=R01300-P
S7 25740 ASPERGILLUS OR SACCHAROMYCES OR ZYGOSACCHAROMYCES OR PICCHIA OR KLUYVEROMYCES OR CANDIDA OR HANSENULA OR DEBARYOMYCES OR MUCOR
S8 49877 TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR BACILLUS OR STREPTOMYCES OR PSEUDOMONAS
S9 74887 S7 OR S8
S10 0 S6 AND S9
S11 99 TRIMETHYLENE(W)GLYCOL OR 1(W)3(W)(PROPANEDIOL OR PROPANE (N)DIOL)
S12 0 S11 AND S9 NOT S10

16jun98 08:33:11 User208600 Session D1155.5

File 34:SciSearch(R) Cited Ref Sci 1990-1998/Jun W1 (c) 1998 Inst for Sci Info

Set Items Description

S1 0 PN=3829618
S2 0 IN=KRETSCHMANN, J?
S3 0 AU=KRETSCHMANN, J?
S4 0 PN= DE 3829618
S5 0 CN=504-63-2
S6 0 CN=R01300-P
S7 67333 ASPERGILLUS OR SACCHAROMYCES OR ZYGOSACCHAROMYCES OR PICCHIA OR KLUYVEROMYCES OR CANDIDA OR HANSENULA OR DEBARYOMYCES OR MUCOR
S8 84013 TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR BACILLUS OR STREPTOMYCES OR PSEUDOMONAS
S9 145475 S7 OR S8
S10 0 S6 AND S9
S11 455 TRIMETHYLENE(W)GLYCOL OR 1(W)3(W)(PROPANEDIOL OR PROPANE (N)DIOL)
S12 22 S11 AND S9 NOT S10

12/6/1 06741658 Genuine Article#: ZP187 Number of References: 30
Title: MOCA and some proposed substitutes (Cyanacure, Conacure, Polacure 740M and Ethacure 300) as two-stage skin carcinogens in HRA/Skh hairless mice (ABSTRACT AVAILABLE)

12/6/2 06496811 Genuine Article#: YX215 Number of References: 53

Title: Metabolic engineering of propanediol pathways (ABSTRACT AVAILABLE)

12/6/3 06396179 Genuine Article#: YP699 Number of References: 17

Title: Carcinogenic activity of the flame retardant, 2,2-bis(bromomethyl)- 1, 3- propanediol in rodents, and comparison with the carcinogenicity of other NTP brominated chemicals (ABSTRACT AVAILABLE)

12/6/406137610 Genuine Article#: XX393 Number of References: 34

Title: Glycerol conversion to 1, 3- propanediol by *Clostridium pasteurianum*: cloning and expression of the gene encoding 1, 3- propanediol dehydrogenase (ABSTRACT AVAILABLE)

12/6/5 06085534 Genuine Article#: XU184 Number of References: 23

Title: Lipase catalysed synthesis of propanediol monoesters in biphasic aqueous medium (ABSTRACT AVAILABLE)

12/6/6 05978839 Genuine Article#: XL855 Number of References: 17

Title: Enantioselectivity of lipase-catalysed transesterification of 2-ethyl- 1, 3- propanediol: Comparison of lipases from bacterial, fungal and animal sources (ABSTRACT AVAILABLE)

12/6/7 05978831 Genuine Article#: XL855 Number of References: 40

Title: Lipase-mediated asymmetric construction of 2-arylpropionic acids: enantiocontrolled syntheses of S- naproxen and S-ibuprofen (ABSTRACT AVAILABLE)

12/6/8 05380292 Genuine Article#: VU832 Number of References: 41

Title: SOLVENT POLARITY INFLUENCES PRODUCT SELECTIVITY OF LIPASE-MEDIATED ESTERIFICATION REACTIONS IN MICROAQUEOUS MEDIA (Abstract Available)

12/6/9 05376612 Genuine Article#: VU413 Number of References: 20

Title: SELECTIVE MONOACYLATION OF DIOL COMPOUNDS BY *ASPERGILLUS-NIGER* LIPASE (Abstract Available)

12/6/10 05326299 Genuine Article#: VQ516 Number of References: 27

Title: KINETIC, DYNAMIC, AND PATHWAY STUDIES OF GLYCEROL METABOLISM BY *KLEBSIELLA-PNEUMONIAE* IN ANAEROBIC CONTINUOUS-CULTURE .1. THE PHENOMENA AND CHARACTERIZATION OF OSCILLATION AND HYSTERESIS (Abstract Available)

12/6/11 05298890 Genuine Article#: VN689 Number of References: 7

Title: SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF 2-ARYLOXY-5,5-DIMETHYL-1,3,2-DIOXAPHOSPHORINANE 2-OXIDES (Abstract Available)

12/6/12 04839864 Genuine Article#: UL527 Number of References: 37

Title: CARBON AND ELECTRON FLOW IN *CLOSTRIDIUM-BUTYRICUM* GROWN IN CHEMOSTAT CULTURE ON GLYCEROL AND ON GLUCOSE (Abstract Available)

12/6/13 04451556 Genuine Article#: TE008 Number of References: 20

Title: ENANTIOSELECTIVE CHEMOENZYMIC SYNTHESIS OF THE S-ENANTIOMER OF THE SYSTEMIC FUNGICIDE FENPROPIIMORPH (Abstract Available)

12/6/14 03270606 Genuine Article#: NR430 Number of References: 34

Title: ENZYMATIC ESTERIFICATION OF DIOLS IN REVERSE MICELLAR MEDIA (Abstract Available)

12/6/15 02536456 Genuine Article#: LJ825 Number of References: 29

Title: FORMATION OF 1,3-CYCLOIC GLYCEROPHOSPHATE BY THE ACTION OF PHOSPHOLIPASE-C ON PHOSPHATIDYLGLYCEROL (Abstract Available)

12/6/16 02483056 Genuine Article#: LE560 Number of References: 23

Title: STUDIES ON THE ENANTIOSELECTIVITY OF THE TRANSESTERIFICATION OF 2-METHYL-1,4-BUTANEDIOL AND ITS DERIVATIVES CATALYZED BY *PSEUDOMONAS-FLUORESCENS* LIPASE IN ORGANIC-SOLVENTS (Abstract Available)

12/6/17 02197515 Genuine Article#: KJ689 Number of References: 54

Title: MARKED DEPENDENCE OF ENZYME PROCHIRAL SELECTIVITY ON THE SOLVENT (Abstract Available)

12/6/18 01695932 Genuine Article#: HT781 Number of References: 20

Title: ENANTIOSELECTIVE TRANSESTERIFICATION OF 2-METHYL- 1, 3- PROPANEDIOL DERIVATIVES CATALYZED BY *PSEUDOMONAS-FLUORESCENS* LIPASE IN AN ORGANIC-SOLVENT (Abstract Available)

12/6/19 01198926 Genuine Article#: GD694 Number of References: 20

Title: ESTERIFICATION OF GLYCOSIDES WITH GLYCEROL AND TRIMETHYLOPROPANE MOIETIES BY CANDIDA-CYLIDRACEA LIPASE (Abstract Available)

12/6/20 00998627 Genuine Article#: FM686 Number of References: 9

Title: ENZYMIC-SYNTHESIS OF ENANTIOMERICALLY PURE CHIRAL SYNTHONS - LIPASE-CATALYZED RESOLUTION OF (R/S, 4E)-2-METHYL-4-HEXEN-1-OL (Abstract Available)

12/6/21 00915283 Genuine Article#: FF269 Number of References: 14

Title: SYNTHESIS OF CHIRAL 3-SUBSTITUTED GAMMA-LACTONES AND 9-FURANOSYL-ADENINE FROM (R)-2-(2,2-DIETHOXYETHYL)- 1, 3- PROPANEDIOL MONOACETATE PREPARED BY LIPASE-CATALYZED REACTION (Abstract Available)

12/6/22 00204392 Genuine Article#: CX734 Number of References: 29

Title: UTILIZATION OF GLYCEROL AS A HYDROGEN ACCEPTOR BY *LACTOBACILLUS-REUTERI* - PURIFICATION OF 1, 3- PROPANEDIOL-NAD+ OXIDOREDUCTASE

12/5/4 DIALOG(R)/File 34:SciSearch(R) Cited Ref Sci (c) 1998 Inst for Sci Info. Allrts. reserv.

06137610 Genuine Article#: XX393 Number of References: 34

Title: Glycerol conversion to 1, 3- propanediol by *Clostridium pasteurianum*: cloning and expression of the gene encoding 1, 3- propanediol dehydrogenase

Author(s): Luers F.; Seyfried M.; Daniel R.; Gottschalk G (REPRINT)

Corporate Source: UNIV GOTTINGEN,INST MIKROBIOLOGIE, GRISEBACHSTR 8/D-37077

GOTTINGEN/GERMANY/ (REPRINT); UNIV GOTTINGEN,INST MIKROBIOLOGIE/D-37077

GOTTINGEN/GERMANY/

Journal: FEMS MICROBIOLOGY LETTERS. 1997, V154, N2 (SEP 15), P337-345

ISSN: 0378-1097 Publication date: 19970915

Publisher: ELSEVIER SCIENCE BV BOX 211, 1000 AE AMSTERDAM, NETHERLANDS

Language: English Document Type: ARTICLE Geographic Location: GERMANY

Subfile: CC LIFE--Current Contents, Life Sciences Journal Subject Category: MICROBIOLOGY

Abstract: When grown on glycerol as sole carbon and energy source, cell extracts of *Clostridium pasteurianum* exhibited activities of glycerol dehydrogenase, dihydroxyacetone kinase, glycerol dehydratase and 1, 3- propanediol dehydrogenase. The genes encoding the latter two enzymes were cloned by colony hybridization using the *dhaT* gene of *Citrobacter freundii* as heterologous DNA probe and expressed in *Escherichia coli*.

The native molecular mass of 1, 3- propanediol dehydrogenase (*DhaT*) is 440 000 Da. The *dhaT* gene of *C. pasteurianum* was subcloned and its nucleotide sequence (1158 bp) was determined. The deduced gene product (41 776 Dal revealed high similarity to *DhaT* of *C. freundii* (80.5% identity; 89.8% similarity).

Descriptors--Author Keywords: *Clostridium pasteurianum*; 1, 3- propanediol dehydrogenase; 1, 3- propanediol; glycerol fermentation; type III alcoholdehydrogenase; glycerol dehydratase

Identifiers--KeyWord Plus(R): *ESCHERICHIA-COLI*; ALCOHOL-DEHYDROGENASE; *CITROBACTER-FREUNDII*; MOLECULAR CHARACTERIZATION; *KLEBSIELLA-PNEUMONIAE*; *ZYMOBACILLUS-MOBILIS*; SEQUENCE-ANALYSIS; DNA REGULON; PROTEINS; OVEREXPRESSION

Research Fronts: 95-0536 001 (11-BETA-HYDROXYSTEROID DEHYDROGENASE; FETAL ORIGINS OF CORONARY HEART-DISEASE; APPARENT MINERALOCORTICOID EXCESS SYNDROMES)

95-3190 001 (INCREASED ABUNDANCE OF SPECIFIC SKELETAL-MUSCLE PROTEIN-TYROSINE PHOSPHATASES; ALPHA-B-CRYSTALLIN EXPRESSION)

95-3375 001 (THERMUS STRAINS; DNA RELATEDNESS; GENUS *AEROMONAS*; EMENDED DESCRIPTION OF *CAMPYLOBACTER-HYDROLYTICUS*; POLYPHASIC TAXONOMY)

95-5061 001 (STRUCTURAL GENE; GLYC-DEPENDENT REGULATION OF *BACILLUS-SUBTILIS* GLUTAMATE SYNTHASE EXPRESSION; *ARABIDOPSIS* TYPE-1 PROTEIN PHOSPHATASE)

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12/5/10DIALOG(R)/File 34:SciSearch(R) Cited Ref Sci(c) 1998 Inst for Sci Info. Allrts. reserv.

05326299 Genuine Article#: VQ516 Number of References: 27

Title: KINETIC, DYNAMIC, AND PATHWAY STUDIES OF GLYCEROL METABOLISM BY *KLEBSIELLA-PNEUMONIAE* IN ANAEROBIC CONTINUOUS-CULTURE .1. THE PHENOMENA AND CHARACTERIZATION OF OSCILLATION AND HYSTERESIS

Author(s): MENZEL K; ZENG AP; BIEBL H; DECKWER WD

Corporate Source: GESELL BIOTECHNOL FORSCH MBH,BIOCHEM ENGN DIV,MASCHERORDER WEG 1/D-38124 BRAUNSCHWEIG/GERMANY/; GESELL BIOTECHNOL FORSCH MBH,BIOCHEM ENGN DIV/D-38124 BRAUNSCHWEIG/GERMANY/

Journal: BIOTECHNOLOGY AND BIOENGINEERING, 1996, V52, N5 (DEC 5), P549-560 ISSN: 0006-3592

Language: ENGLISH Document Type: ARTICLE Geographic Location: GERMANY

Subfile: SciSearch; CC LIFE--Current Contents, Life Sciences; CC AGRI-- Current Contents, Agriculture, Biology & Environmental Sciences Journal Subject Category: BIOTECHNOLOGY & APPLIED MICROBIOLOGY

Abstract: Oscillation and hysteresis phenomena are observed in the anaerobic continuous fermentation of glycerol by *Klebsiella pneumoniae* in long-term cultivations under a variety of conditions. In this work, the conditions for the occurrence of these phenomena are reported and the patterns of cell growth and metabolism under oscillation are characterized. During an oscillation period, the formation rates of CO₂, H₂, and formate and the consumption rate of alkali periodically pass values of maxima and minima, the latter being close to zero. The formation of biomass and fermentation products such as 1, 3- propanediol, acetate, and ethanol also undergo periodic changes which shift maxima and minima. Sustained oscillation occurs only under conditions of substrate excess within a distinct regime. At pH 7.0, it is only found at dilution rates above 0.15 h⁻¹ under the experimental conditions. At lower pH values, oscillations are more likely to happen, even at a relatively low dilution rate and low substrate excess. Whereas the amplitude of oscillations at pH 7.0 depends on both the dilution rate and the residual glycerol concentration (C-Glyc) the interval of oscillations appears to be only a function of C-Glyc. An increase of C-Glyc in culture damps the oscillation and leads to its disappearance at C-Glyc = 1100 to 1200 mmol/L (pH 7.0). The operation mode was also found to be an important parameter in determining the stability and actual state of the culture, resulting in hysteresis under certain conditions, particularly at low pH values. Generally, a large perturbation of cultivation conditions tends to cause oscillation and hysteresis. The results unambiguously demonstrate that the oscillation and hysteresis phenomena shown in this work are bound to genuine metabolic fluctuations of the microorganism. They reveal several differences and new features compared with those reported in the literature and cannot be readily explained by the mechanisms known so far.

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Descriptors--Author Keywords: GLYCEROL FERMENTATION; *KLEBSIELLA PNEUMONIAE*; OSCILLATION; HYSTERESIS; GROWTH AND METABOLISM; SUBSTRATE EXCESS

Identifiers--KeyWords Plus: SACCHAROMYCES -CEREVISIAE; ZYMOGENESIS; MOBILIS; CHEMOSTAT CULTURE; FERMENTATION; BEHAVIOR; GROWTH; MODEL; 1,3 - PROPANEDIOL; YEAST

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ZENG AP, 1994, V44, P902, BIOTECHNOL BIOENG
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12/5/12 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci(c) 1998 Inst for Sci Info. Allrts. reserv.

04839864 Genuine Article#: UL527 Number of References: 37

Title: CARBON AND ELECTRON FLOW IN CLOSTRIDIUM-BUTYRICUM GROWN IN CHEMOSTAT CULTURE ON GLYCEROL AND ON GLUCOSE

Author(s): ABBADANDALOUSSI S; DURR C; RAVAL G; PETITDEMANGE H

Corporate Source: UNIV NANCY 1, LAB CHIM BIOL 1, BP 239/F-54506 VANDOEUVRE NANCY//FRANCE/

UNIV NANCY 1, LAB CHIM BIOL 1/F-54506 VANDOEUVRE NANCY//FRANCE/

Journal: MICROBIOLOGY-UK, 1996, V142, MAY (MAY), P1149-1158 ISSN: 1350-0872 Language: ENGLISH

Document Type: ARTICLE Geographic Location: FRANCE

Subfile: SciSearch; CC LIFE--Current Contents, Life Sciences/ Journal Subject Category: MICROBIOLOGY

Abstract: The metabolism of Clostridium butyricum DSM 5431 was studied in chemostat culture under carbon limitation using either glucose or glycerol. On glycerol, the enzymes glyceroldehydrogenase, diol dehydratase and 1,3-propanediol (1,3-PD) dehydrogenase constitute the branch point that partitions the carbon flux between the competing pathways, i.e. formation of either 1,3-PD or acetate and butyrate. The increasing levels of these enzyme activities with increasing dilution rates (D) explained the constant proportion of glycerol conversion into 1,3-PD. The production of acetate or butyrate constitutes another important branch point and when D increased (i) large amounts of intracellular acetyl-CoA accumulated, (ii) the carbon flux switched from butyric acid to acetic acid, (iii) the specific activity of thiolase was not affected, suggesting this enzyme may be the bottleneck for carbon flux to butyrate biosynthesis providing an explanation for the accumulation of large amounts of intracellular acetyl-CoA, and (iv) high levels of NADH were found in the cell. Oxidation of NADH by 1,3-PD dehydrogenase was linked to the production of 3-hydroxypropionaldehyde (3-HPA) by glycerol dehydratase. The fact that high intracellular concentrations of NADH were found means that diol dehydratase activity is the rate-limiting step in 1,3-PD formation, avoiding the accumulation of 3-HPA which is a very toxic compound. The specific rate of glucose catabolism ($q(\text{glucose}) = 11.1 \text{ mmol h}^{-1} \text{ g}^{-1}$) was around four times lower than the specific rate of glycerol catabolism ($q(\text{glucose}) = 57.4 \text{ mmol h}^{-1} \text{ g}^{-1}$). On glucose-grown cells, reducing equivalents which are released in the glycolytic pathway were reoxidized by the butyric pathway and the low specific formation rate of butyric acid led to an increase in the intracellular level of acetyl-CoA and NADH. Carbon flow was higher on glycerol due to the reoxidation of NADH by both butyric and PD pathways.

Descriptors--Author Keywords: CLOSTRIDIUM BUTYRICUM; GLYCEROL CATABOLISM; GLUCOSE

CATABOLISM; CARBON FLOW; ELECTRON FLOW

Identifiers--KeyWords Plus: FERREDOXIN OXIDOREDUCTASES; PASTEURIANUM LMG-3285; PRODUCT INHIBITION; SOLVENT PRODUCTION; 1,3-PROPANEDIOL; FERMENTATION; ACETOBUTYLICUM; NADH
Research Fronts: 94-3070 001 (RAT SKELETAL-MUSCLE; DEVELOPMENTAL REGULATION; YEAST SACCHAROMYCES -CEREVISIAE)

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12/5/22 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci(c) 1998 Inst for Sci Info. Allrts. reserv.

00204392 Genuine Article#: CX734 Number of References: 29

Title: UTILIZATION OF GLYCEROL AS A HYDROGEN ACCEPTOR BY LACTOBACILLUS-REUTERI - PURIFICATION OF 1,3-PROPANEDIOL-NAD+ OXIDOREDUCTASE

Author(s): TALARICO TL; AXELSSON LT; NOVOTNY J; FIUZAT M; DOBROGOSZ WJ

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LOCALIZATION; CALCIUM-ACTIVATED PROTEIN-KINASE; GLUTATHIONE S-TRANSFERASE)

88-4564 001 (ALKALOPHILIC BACILLUS SP; MALIC ENZYME; MALTOHEXAOSE-FORMING AMYLASES;

RIBOFLAVIN-BINDING PROTEIN)

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S5 96 RD (unique items)

S6 14 S4 NOT DHABI

S7 14 ID (sorted in duplicate order)

2/6/1 (Item 1 from file: 155)09434432 98096792

Construction and characterization of a 1,3-propanediol operon.

2/6/2 (Item 2 from file: 5) 14092702 BIOSIS Number: 01092702

Construction and characterization of a 1,3-propanediol operon Print Number: Biological Abstracts Vol. 105 Iss. 005 Ref. 064977

2/6/3 (Item 3 from file: 155) 07262836 92173858

Is Dhat culture bound? [letter] [see comments]

2/6/4 (Item 4 from file: 5) 1846249 BIOSIS Number: 61010809

Dhat syndrome A CULTURE BOUND SEX NEUROSIS OF THE ORIENT

2/6/5 (Item 5 from file: 155) 02063392 76060886

Dhat syndrome: a culture-bound sex neurosis of the orient.

2/6/6 (Item 6 from file: 155) 08917159 97046159

The 'Dhat syndrome': a culturally determined symptom of depression?

2/6/7 (Item 7 from file: 5) 13237955 BIOSIS Number: 99237955
The 'Dhat syndrome': A culturally determined symptom of depression? Print Number: Biological Abstracts Vol. 102 Iss. 010 Ref. 153585

2/6/8 (Item 8 from file: 155) 08326563 95297374
Dhat syndrome: Is it a distinct clinical entity? A study of illness behaviour characteristics.

2/6/9 (Item 9 from file: 5) 11594086 BIOSIS Number: 98194086
Dhat syndrome: Is it a distinct clinical entity? A study of illness behaviour characteristics Print Number: Biological Abstracts Vol. 099 Iss. 009 Ref. 134389

2/6/10 (Item 10 from file: 155) 05697573 90215824
Dhat syndrome—a useful clinical entity.

2/6/11 (Item 11 from file: 5) 9060870 BIOSIS Number: 93045870
DHAT SYNDROME A USEFUL DIAGNOSTIC ENTITY IN INDIAN CULTURE

2/6/12 (Item 12 from file: 155) 07438128 92096793
Dhat syndrome—a useful diagnostic entity in Indian culture [see comments]

2/6/13 (Item 13 from file: 155) 06428746 90352450
Dhat syndrome. A sex neurosis of the Indian subcontinent.

2/6/14 (Item 14 from file: 5) 7653425 BIOSIS Number: 90021425
DHAT SYNDROME A SEX NEUROSIS OF THE INDIAN SUBCONTINENT

2/6/15 (Item 15 from file: 5) 7706073 BIOSIS Number: 90074073
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2/6/16 (Item 16 from file: 155) 09281984 97457194
Glycerol conversion to 1,3-propanediol by *Clostridium pasteurianum*: cloning and expression of the gene encoding 1,3-propanediol dehydrogenase.

2/6/17 (Item 17 from file: 5) 13751846 BIOSIS Number: 99751846
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2/6/19 (Item 19 from file: 155) 08287549 95238288
Purification of 1,3-propanediol dehydrogenase from *Citrobacter freundii* and cloning, sequencing, and overexpression of the corresponding gene in *Escherichia coli*.

2/6/20 (Item 20 from file: 5) 11672114 BIOSIS Number: 98272114
Purification of 1,3-propanediol dehydrogenase from *Citrobacter freundii* and cloning, sequencing, and overexpression of the corresponding gene in *Escherichia coli* Print Number: Biological Abstracts Vol. 099 Iss. 012 Ref. 177032

2/6/21 (Item 21 from file: 5) 6505458 BIOSIS Number: 85105979
PSYCHASTHENIC SYNDROME RELATED TO LEUKORRHEA IN INDIAN WOMEN

2/6/22 (Item 22 from file: 5) 11877891 BIOSIS Number: 98477891
Sexual dysfunction on the Indian subcontinent Print Number: Biological Abstracts/RRM Vol. 047 Iss. 011 Ref. 179518

2/6/23 (Item 23 from file: 5) 7109056 BIOSIS Number: 88031801
SEXUAL PROBLEMS IN THE YOUNG ADULTS OF BUNDELKHAND REGION INDIA

2/6/24 (Item 24 from file: 155) 07442347 92152855
1,3-Propanediol production by *Escherichia coli* expressing genes from the *Klebsiella pneumoniae* dha regulon.

2/6/25 (Item 25 from file: 5) 9066822 BIOSIS Number: 93051822
1,3-PROPANEDIOL PRODUCTION BY *ESCHERICHIA-COLI* EXPRESSING GENES FROM THE *KLEBSIELLA-PNEUMONIAE* DHA REGULON

2/7/1 (Item 1 from file: 155) DIALOG(R)File 155:MEDLINE(R) (c) format only 1998 Dialog Corporation. All rights reserved.
09434432 98096792
Construction and characterization of a 1,3-propanediol operon.
Skraly FA; Lytle BL; Cameron DC
Department of Chemical Engineering, University of Wisconsin-Madison, Madison 53706-1691, USA.
Appl Environ Microbiol (UNITED STATES) Jan 1998, 64 (1) p98-105, ISSN 0099-2240 Journal Code: 6K6
Contract/Grant No.: 5 T32 GM08349-04, GM, NIGMS
Languages: ENGLISH Document type: JOURNAL ARTICLE
The genes for the production of 1,3-propanediol (1,3-PD) in *Klebsiella pneumoniae*, dhaB, which encodes glycerol dehydratase, and dhaT, which encodes 1,3-PD oxidoreductase, are naturally under the control of two different promoters and are transcribed in different directions. These genes were reconfigured into an operon containing dhaB followed by dhaT under the control of a single promoter. The operon contains unique restriction sites to facilitate replacement of the promoter and other modifications. In a fed-batch cofermentation of glycerol and glucose, *Escherichia coli* containing the operon consumed 9.3 g of glycerol per liter and produced 6.3 g of 1,3-PD per liter. The fermentation had two distinct phases. In the first phase, significant cell growth occurred and the products were mainly 1,3-PD and acetate. In the second phase, very little growth occurred and the main products were 1,3-PD and pyruvate. The first enzyme in the 1,3-PD pathway, glycerol dehydratase, requires coenzyme B12, which must be provided in *E. coli* fermentations. However, the amount of coenzyme B12 needed was quite small, with 10 nM sufficient for good 1,3-PD production in batch cofermentations. 1,3-PD is a useful intermediate in the production of polyesters. The 1,3-PD operon was designed so that it can be readily modified for expression in other prokaryotic hosts; therefore, it is useful for metabolic engineering of 1,3-PD pathways from glycerol and other substrates such as glucose.

2/7/1 (Item 1 from file: 155) 08744699 96422012

Cloning, sequencing, and overexpression of the genes encoding coenzyme B12-dependent glycerol dehydratase of *Citrobacter freundii*.

2/6/2 (Item 2 from file: 5) 13246298 BIOSIS Number: 99246298
Cloning, sequencing, and overexpression of the genes encoding coenzyme B-12-dependent glycerol dehydratase of *Citrobacter freundii* Print Number: Biological Abstracts Vol. 102 Iss. 011 Ref. 161928

2/6/3 (Item 3 from file: 5) 7160452 BIOSIS Number: 88083197
COMMUNITY ORGANIZATION OF BENTHIC DIPTERANS IN THE LITTORAL ZONE OF HOOGHLY ESTUARY SAGAR ISLAND INDIA

2/6/4 (Item 4 from file: 5) 7689622 BIOSIS Number: 90057622
COMPARATIVE GROWTH ANALYSIS OF JUTE VARIETIES *CORCHORUS-CAPSULARIS* L. AND *CORCHORUS-OLITORIUS* L.

2/6/5 (Item 5 from file: 5) 14042356 BIOSIS Number: 01042356
Conformational flexibility of poly(ethylenimine) and its derivatives Print Number: Biological Abstracts Vol. 105 Iss. 003 Ref. 028914

2/6/6 (Item 6 from file: 5) 5809092 BIOSIS Number: 83071399
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2/6/10 (Item 10 from file: 155) 08772929 96409458
EPR spin trapping study of the decomposition of azo compounds in aqueous solutions by ultrasound: potential for use as sonodynamic sensitizers for cell killing.

2/6/11 (Item 11 from file: 5) 2971343 BIOSIS Number: 69008750
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2/6/14 (Item 14 from file: 5) 8618093 BIOSIS Number: 92083093
PROXIMATE COMPOSITION A COMPARISON OF S-718 JUTE WITH *CORCHORUS-CAPSULARIS* AND *CORCHORUS-OLITORIUS*

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S1 178 GLYCEROL(W)DEHYDRATASE

S2 392385 TORULOPSIS OR METHYLOBACTER OR SALMONELLA OR

BACILLUS OR STREPTOMYCES OR PSEUDOMONAS

S3 250258 ASPERGILLUS OR SACCHAROMYCES OR

ZYGOSACCHAROMYCES OR PICHIA OR KLUYVEROMYCES OR CANDIDA

OR HANSENULA OR DEBARYOMYCES OR MUCOR

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S7 0 4.2.1.30

S8 0 4.2.1.30/ID

S9 15 EC 4.2.1.30/ID

5/6/1 (Item 1 from file: 5) 6478452 BIOSIS Number: 85078973

ATR1 A SACCHAROMYCES-CEREVISIAE GENE ENCODING A TRANSMEMBRANE PROTEIN REQUIRED FOR AMINOTRIAZOLE RESISTANCE

5/6/2 (Item 2 from file: 73) 10576332 EMBASE No: 98007300

A base-off analogue of coenzyme-B12 with a modified nucleotide loop 1H-NMR structure analysis and kinetic studies with (R)-methylmalonyl-CoA mutase, glycerol dehydratase, and diol dehydratase

5/6/3 (Item 3 from file: 5) 9545782 BIOSIS Number: 94050782

A CODING REGION SEGMENT IS NECESSARY BUT NOT SUFFICIENT FOR RAPID DECAY OF THE HIS3 MRNA IN YEAST

5/6/4 (Item 4 from file: 5) 7126193 BIOSIS Number: 88048938

CLONING OF HISTIDINE GENES OF AZOSPIRILLUM-BRASILENSE ORGANIZATION OF THE ABFH GENE CLUSTER AND NUCLEOTIDE SEQUENCE OF THE HISB GENE

5/6/5 (Item 5 from file: 5) 3052704 BIOSIS Number: 70002611

A PHYSICAL GENETIC AND TRANSCRIPTIONAL MAP OF THE CLONED HIS-3 GENE REGION OF SACCHAROMYCES-CEREVISIAE

5/6/6 (Item 6 from file: 5) 5324378 BIOSIS Number: 81091685

GENE STRUCTURE IN THE HISTIDINE OPERON OF ESCHERICHIA-COLI IDENTIFICATION AND NUCLEOTIDE SEQUENCE OF THE HIS-B GENE

5/6/7 (Item 7 from file: 5) 11171565 BIOSIS Number: 97371565

Isolation and characterization of cDNAs encoding imidazoleglycerolphosphate dehydratase from Arabidopsis thaliana Print Number: Biological Abstracts Vol. 098 Iss. 005 Ref. 060054

5/6/8 (Item 8 from file: 155) 09269790 97296406

Kinetic investigations with inhibitors that mimic the posthomolysis intermediate in the reactions of coenzyme-B12-dependent glycerol dehydratase and diol dehydratase.

5/6/9 (Item 9 from file: 5) 10016508 BIOSIS Number: 95016508

MOLECULAR CLONING OF THE IMIDAZOLEGLYCEROLPHOSPHATE DEHYDRATASE GENE OF TRICHODERMA-HARZIANUM BY GENETIC COMPLEMENTATION IN SACCHAROMYCES -CEREVISIAE USING A DIRECT EXPRESSION VECTOR

5/6/10 (Item 10 from file: 5) 11585026 BIOSIS Number: 98185026

Purification and characterization of the imidazoleglycerol-phosphate dehydratase of Saccharomyces cerevisiae from recombinant Escherichia coli Print Number: Biological Abstracts Vol. 099 Iss. 009 Ref. 125329

5/6/11 (Item 11 from file: 155) 09298196 98012959

Propanediol utilization genes (pdu) of Salmonella typhimurium: three genes for the propanediol dehydratase.

5/6/12 (Item 12 from file: 5) 2762833 BIOSIS Number: 68017740

PROTEOLYTIC DEGRADATION OF IMIDAZOLE GLYCEROL PHOSPHATE DEHYDRATASE HISTIDINOL PHOSPHATE FROM SALMONELLA-TYPHIMURIUM AND THE ISOLATION OF A RESISTANT BI FUNCTIONAL CORE ENZYME

5/5/1 (Item 1 from file: 5) DIALOG(R)File 5:BIOSIS PREVIEWS(R) (c) 1998 BIOSIS. Alts. reserv.

6478452 BIOSIS Number: 85078973

ATR1 A SACCHAROMYCES-CEREVISIAE GENE ENCODING A TRANSMEMBRANE PROTEIN REQUIRED FOR AMINOTRIAZOLE RESISTANCE

KANAZAWA S; DRISCOLL M; STRUHL K

DEP. BIOLOGICAL CHEM. HARVARD MED. SCH., BOSTON, MASS. 02115.

MOL CELL BIOL 8 (2). 1988. 664-673. CODEN: MCEBD Full Journal Title: Molecular and Cellular Biology

Language: ENGLISH

In Saccharomyces cerevisiae, 3-amino-1,2,4-triazole (aminotriazole) competitively inhibits the activity of imidazoleglycerolphosphate dehydratase, the product of the HIS3 gene. Wild-type strains are able to grow in the presence of 10 mM aminotriazole because they induce the level of imidazoleglycerolphosphate dehydratase. However, strains containing *gcn4* mutations are unable to grow in medium containing aminotriazole because they lack the *GCN4* transcriptional activator protein necessary for the coordinate induction of *HIS3* and other amino acid biosynthetic genes. Here, we isolated a new gene, designated *ATR1*, which when present in multiple copies per cell allowed *gcn4* mutant strains to grow in the presence of aminotriazole. In wild-type strains, multiple

copies of *ATR1* permitted growth at even high concentrations of aminotriazole (80 mM), whereas a chromosomal deletion of *ATR1* caused growth inhibition at very low concentrations (5 mM). When radioactive aminotriazole was added exogenously, cells with multiple copies of *ATR1* accumulated less aminotriazole than wild-type cells, whereas cells with the *atr1* deletion mutation retained more aminotriazole. Unlike the mammalian *mdr* or yeast *PDR* genes that confer resistance to many drugs, *ATR1* appears to confer resistance only to aminotriazole. Genetic analysis, mRNA mapping, and DNA sequencing revealed that (i) the primary translation product of *ATR1* contains 547 amino acids, (ii) *ATR1* transcription is induced by aminotriazole, and (iii) the *ATR1* promoter region contains a binding site for the *GCN4* activator protein. The deduced amino acid sequence suggests that *ATR1* protein is very hydrophobic with many membrane-spanning regions, has several potential glycosylation sites, and may contain an ATP-binding site. We suggest that *ATR1* encodes a membrane-associated component of the machinery responsible for pumping aminotriazole (and possibly other toxic compounds) out of the cell.

Descriptors/Keywords: IMIDAZOLE GLYCEROL PHOSPHATE DEHYDRATASE TOXIN

AUTORADIOGRAPHY DNA SEQUENCE ATP BINDING SITE

Concept Codes:

*02504 Cytology and Cytochemistry-Plant

*03504 Genetics and Cytogenetics-Plant

*10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines

*10064 Biochemical Studies-Proteins, Peptides and Amino Acids

*10300 Replication, Transcription, Translation

*10506 Biophysics-Molecular Properties and Macromolecules

*10508 Biophysics-Membrane Phenomena

10052 Biochemical Methods-Nucleic Acids, Purines and Pyrimidines

10060 Biochemical Studies-General

Biosystematic Codes:

15100 Ascomycetes

Super Taxa:

Microorganisms; Plants; Nonvascular Plants; Fungi

5/5/3 (Item 3 from file: 5) DIALOG(R)File 5:BIOSIS PREVIEWS(R) (c) 1998 BIOSIS. Alts. reserv.

9545782 BIOSIS Number: 94050782

A CODING REGION SEGMENT IS NECESSARY BUT NOT SUFFICIENT FOR RAPID DECAY OF THE HIS3 MRNA IN YEAST

HERRICK D; JACOBSON A

DEP. MOL. GENETICS AND MICROBIOL., UNIV. MASSACHUSETTS MED. SCH., 55 LAKE AVE. NORTH, WORCESTER, MASS. 01655, USA.

GENE (AMST) 114 (1). 1992. 35-41. CODEN: GENED Full Journal Title: GENE (Amsterdam) Language:

ENGLISH

In *Saccharomyces cerevisiae*, the *HIS3* (encoding imidazoleglycerolphosphate dehydratase) mRNA is unstable ($t_{1/2} = 7$ min), whereas the *ACT1* (encoding actin) mRNA is more stable ($t_{1/2} = 30$ min). To define determinants responsible for rapid mRNA decay, hybrid genes comprised of various regions of these two mRNAs were constructed, transformed into yeast on centromere-containing vectors, and the half-lives of the resultant chimeric mRNAs were measured. To examine whether the 3'-untranslated region (3'-UTR) of *HIS3* can confer instability to the *ACT1* mRNA, DNA encoding the 3'-UTR of *ACT1* was replaced with the corresponding region of *HIS3*. The hybrid mRNA containing the *HIS3* 3'-UTR decayed at a rate similar to the endogenous *ACT1* mRNA. The mRNA containing the *HIS3* 5'-UTR and most of the *HIS3* coding region fused to an *ACT1* 3'-fragment was unstable, indicating that *HIS3* instability determinants are located within the *HIS3* 5'-UTR or coding sequence. Deleting 411 nucleotides (nt) from the coding region of either *HIS3* or the 5'-*HIS3*-*ACT1* 3' chimeric gene resulted in a three- to fourfold stabilization of the respective mRNAs. However, insertion of this 411-nt fragment in-frame into the entire *ACT1* gene had no destabilizing effect on the resultant hybrid mRNA. We conclude that the instability determinants of *HIS3* mRNA are complex, involving a coding region segment and, possibly, the 5'-UTR.

Descriptors/Keywords: SACCHAROMYCES -CEREVISIAE ACTIN ENCODING MESSENGER RNA IMIDAZOLE GLYCEROLPHOSPHATE DEHYDRATASE ENCODING MESSENGER RNA CHIMERIC MESSENGER RNA

Concept Codes:

*03504 Genetics and Cytogenetics-Plant

*10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines

*51518 Plant Physiology, Biochemistry and Biophysics-Enzymes

*51519 Plant Physiology, Biochemistry and Biophysics-Metabolism

*51522 Plant Physiology, Biochemistry and Biophysics-Chemical Constituents

10064 Biochemical Studies-Proteins, Peptides and Amino Acids

10506 Biophysics-Molecular Properties and Macromolecules

10808 Enzymes-Physiological Studies

13014 Metabolism-Nucleic Acids, Purines and Pyrimidines Biosystematic Codes:

15100 Ascomycetes

Super Taxa:

Microorganisms; Plants; Nonvascular Plants; Fungi

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7126193 BIOSIS Number: 88048938

CLONING OF HISTIDINE GENES OF AZOSPIRILLUM-BRASILENSE ORGANIZATION OF THE ABFH GENE CLUSTER AND NUCLEOTIDE SEQUENCE OF THE HISB GENE

FANI R; BAZZICALUPO M; DAMIANI G; BIANCHI A; SCHIPANI C; SGARAMELLA V; POLSINELLI M

DIP. DI BIOL. ANIMALE E GENETICA, UNIV. DI FIRENZE, VIA ROAMANA 17, FIRENZE, ITALY.

MOL GEN GENET 216 (2-3). 1989. 224-229. CODEN: MGGEA Full Journal Title: Molecular & General

Genetics Language: ENGLISH

A cluster of four *Azospirillum brasilense* histidine biosynthetic genes, *hisA*, *hisB*, *hisF* and *hisH*, was identified on a 4.5 kb DNA fragment and its organization studied by complementation analysis of *Escherichia coli* mutations and nucleotide sequence. The nucleotide sequence of a 1.3 kb fragment that complemented the *E. coli* *hisB* mutation was determined and an ORF of 624 nucleotides which can code for a protein of 207 amino acids was identified. A significant base sequence homology with the carboxyterminal moiety of the *E. coli* *hisB* gene (0.53) and the *Saccharomyces cerevisiae* *HIS3* gene (0.44), coding for an imidazole glycerolphosphate dehydratase activity was found. The amino acid sequence and composition, the hydrophobic profile and the predicted secondary structures of the yeast, *E. coli* and *A. brasilense* proteins were compared. The significance of the data presented is discussed.

Descriptors/Keywords: ESCHERICHIA-COLI SACCHAROMYCES -CEREVISIAE IMIDAZOLE GLYCEROLPHOSPHATE DEHYDRATASE MOLECULAR SEQUENCE DATA DEDUCED AMINO ACID SEQUENCE SECONDARY STRUCTURE

Concept Codes:

*03504 Genetics and Cytogenetics-Plant

*10010 Comparative Biochemistry, General

*10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines

*10802 Enzymes-General and Comparative Studies; Coenzymes

*10806 Enzymes-Chemical and Physical
 *31000 Physiology and Biochemistry of Bacteria
 *31500 Genetics of Bacteria and Viruses
 *51518 Plant Physiology, Biochemistry and Biophysics-Enzymes
 10064 Biochemical Studies-Proteins, Peptides and Amino Acids
 10506 Biophysics-Molecular Properties and Macromolecules
 Biosystematic Codes:
 04610 Spirillaceae (1979-)
 04810 Enterobacteriaceae (1979-)
 15100 Ascomycetes
 Super Taxa:
 Microorganisms; Bacteria; Plants; Nonvascular Plants; Fungi

5/5/5 (Item 5 from file: 5) DIALOG(R)File 5:BIOSIS PREVIEWS(R) (c) 1998 BIOSIS. Allts. reserv.
 3052704 BIOSIS Number: 70002611
 A PHYSICAL GENETIC AND TRANSCRIPTIONAL MAP OF THE CLONED HIS-3 GENEREION OF
 SACCHAROMYCES-CEREVISIAE
 STRUHL K; DAVIS R W
 DEP. BIOCHEM., STANFORD UNIV. SCH. MED., STANFORD, CALIF. 94305, USA.
 J MOL BIOL 136 (3). 1980. 309-332. CODEN: JMOBA Full Journal Title: Journal of Molecular Biology
 Language: ENGLISH

A cloned fragment of *S. cerevisiae* (yeast) DNA containing the structural gene for imidazoleglycerolphosphate dehydratase (*his3*) was mapped using a combination of physical techniques and classical bacteriophage .lambda. genetics. A physical map was constructed using subcloned restriction endonuclease fragments from the original yeast DNA fragment (Sc2601) and using deletion mutants of a bacteriophage .lambda. hybrid containing Sc2601. The deletion endpoints within the yeast DNA segment were mapped with respect to restriction endonuclease cleavage sites of Sc2601. The wild-type *his3* gene, as defined by complementation of an *Escherichia coli* auxotroph lacking imidazoleglycerolphosphate dehydratase activity, is localized to a 700 base pair [bp] region. The 5' and 3' endpoints of the gene are defined within limits of 50 bp. The lesions in cloned mutant *his3* genes that are non-functional in yeast and in *E. coli* were mapped by phage recombination using deletion mutants of the *his3* gene generated in *E. coli*. Transcription of the *his3* gene in *E. coli* is initiated from a promoter located less than 100 bp from the start of the structural gene.

Descriptors/Keywords: ESCHERICHIA-COLI BACTERIO PHAGE LAMBDA IMIDAZOLE GLYCEROL PHOSPHATE DEHYDRATASE RESTRICTION ENDO NUCLEASE DELETION MUTANT COMPLEMENTATION PROMOTER STRUCTURAL GENE MAPPING CLONE GENETIC ENGINEERING
 Concept Codes:

*02504 Cytology and Cytochemistry-Plant
 *03504 Genetics and Cytogenetics-Plant
 *10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines
 *10300 Replication, Transcription, Translation
 *10506 Biophysics-Molecular Properties and Macromolecules
 *10808 Enzymes-Physiological Studies
 *13012 Metabolism-Proteins, Peptides and Amino Acids
 *13014 Metabolism-Nucleic Acids, Purines and Pyrimidines
 *51518 Plant Physiology, Biochemistry and Biophysics-Enzymes
 10052 Biochemical Methods-Nucleic Acids, Purines and Pyrimidines
 10064 Biochemical Studies-Proteins, Peptides and Amino Acids
 10804 Enzymes-Methods
 31000 Physiology and Biochemistry of Bacteria
 31500 Genetics of Bacteria and Viruses
 32000 Microbiological Apparatus, Methods and Media
 33504 Virology-Bacteriophage
 51522 Plant Physiology, Biochemistry and Biophysics-Chemical Constituents
 Biosystematic Codes:
 02100 Bacterial Viruses (1979-80)
 04810 Enterobacteriaceae (1979-)
 15100 Ascomycetes
 Super Taxa:
 Microorganisms; Viruses; Bacteria; Plants; Nonvascular Plants; Fungi

5/5/6 (Item 6 from file: 5) DIALOG(R)File 5:BIOSIS PREVIEWS(R) (c) 1998 BIOSIS. Allts. reserv.
 5324378 BIOSIS Number: 81091685
 GENE STRUCTURE IN THE HISTIDINE OPERON OF ESCHERICHIA-COLI IDENTIFICATIONAND
 NUCLEOTIDE SEQUENCE OF THE HIS-B GENE
 CHIARIOTTI L; NAPPO A G; CARLOMAGNO M S; BRUNI C B
 CENT. ENDOCRINOL. ONCOL. SPERIMENTALE CNR, DIP. BIOL. PATOL. CELLULARE MOLECOLARE,
 UNIV. NAPOLI, NAPLES, ITALY.
 MOL GEN GENET 202 (1). 1986. 42-47. CODEN: MGGEA Full Journal Title: Molecular & General Genetics
 Language: ENGLISH

The bifunctional enzyme imidazoleglycerolphosphate dehydratase andhistidinolphosphate phosphatase is encoded by the *hisB* gene. The fourth gene of the histidine operon, *hisB*, was cloned and mapped on a 2,300 base pair DNA fragment. In the present study we report the complete nucleotide sequence of the *hisB* gene of *Escherichia coli*. The gene is 1,068 nucleotides long and codes for a protein of 355 amino acids with an apparent molecular weight of 39,998 daltons. The protein product(s) of the *hisB* region of both *Salmonella typhimurium* and *E. coli* were identified by subcloning and expression in an in vitro translation system. In both organisms the *hisB* gene directed the synthesis of a single protein with an apparent molecular weight of 40,500 daltons, consistent with the data derived from the nucleotide sequence analysis.

Descriptors/Keywords: SALMONELLA -TYPHIMURIUM BIFUNCTIONAL ENZYME DNA CLONING MAPPING EXPRESSION AMINO-ACIDS

Concept Codes:
 *10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines
 *10064 Biochemical Studies-Proteins, Peptides and Amino Acids
 *10300 Replication, Transcription, Translation
 *10506 Biophysics-Molecular Properties and Macromolecules
 *10806 Enzymes-Chemical and Physical
 *13012 Metabolism-Proteins, Peptides and Amino Acids
 *13014 Metabolism-Nucleic Acids, Purines and Pyrimidines
 *31000 Physiology and Biochemistry of Bacteria
 *31500 Genetics of Bacteria and Viruses
 10010 Comparative Biochemistry, General
 10052 Biochemical Methods-Nucleic Acids, Purines and Pyrimidines
 10054 Biochemical Methods-Proteins, Peptides and Amino Acids
 10060 Biochemical Studies-General
 10802 Enzymes-General and Comparative Studies; Coenzymes

10804 Enzymes-Methods
 10808 Enzymes-Physiological Studies
 32000 Microbiological Apparatus, Methods and Media
 32600 In Vitro Studies, Cellular and Subcellular
 Biosystematic Codes:
 04810 Enterobacteriaceae (1979-)
 Super Taxa:
 Microorganisms; Bacteria

5/5/8 (Item 8 from file: 155) DIALOG(R)File 155:MEDLINE(R) (c) format only 1998 Dialog Corporation. Allts. reserv.

09269790 97296406

Kinetic investigations with inhibitors that mimic the posthomolysisintermediate in the reactions of coenzyme-B12-dependent glycerol dehydratase and diol dehydratase.

Poppe L; Reley J

Department of Biochemistry, Institute of Organic Chemistry, University of Karlsruhe, Germany.
 Eur J Biochem (GERMANY) Apr 15 1997; 245 (2) p398-401, ISSN 0014-2956 Journal Code: EMZ Languages:
 ENGLISH Document type: JOURNAL ARTICLE JOURNAL ANNOUNCEMENT: 9709 Subfile: INDEX
 MEDICUS

Kinetic investigations were performed on the coenzyme-B12-dependent glycerol dehydratase and diol dehydratase reactions using 1,2-propanediol as substrate and [omega-(adenosin-5'-O-yl)alkyl]cobalamins as mimics of the posthomolysis intermediate state of the coenzyme. All the coenzyme-B12 analogues with oligomethylene chains (C3-C7) inserted between the central Co atom and the 5' O of the adenosine moiety were competitive inhibitors with respect to coenzyme B12. The apparent inhibition constants (K_i) of the shorter-chain inhibitors, especially the C5 inhibitor, were smaller for both enzymes than those of the longer-chain (C6, C7) compounds. These results are in agreement with the expected (0.6-0.9 nm) distance between the Co and 5'-methylene paramagnetic centers in the posthomolysis intermediate state of coenzyme B12 in these reactions.

Tags: Support, Non-U.S. Gov't

Descriptors: *Cobamides--Metabolism--ME; *Enzyme Inhibitors--Metabolism--ME; *Hydro-Lyases--Metabolism--ME; *Propanediol Dehydratase--Metabolism--ME; Adenosine--Metabolism--ME; Antioxidants--Metabolism--ME; Binding, Competitive; Catalysis; Citrobacter; Cobamides--Chemistry--CH; Electron Spin Resonance Spectroscopy; Enzyme Inhibitors--Chemical Synthesis--CS; Escherichia coli; Isomerism; Kinetics; Porphyrins--Metabolism--ME;

Propylene Glycols--Metabolism--ME; Protein Conformation; Salmonellatyphimurium; Vehicles--Metabolism--ME
 CAS Registry No.: 0 (Antioxidants); 0 (Cobamides); 0 (Enzyme Inhibitors); 0 (Porphyrins); 0 (Propylene Glycols); 0 (Vehicles); 13870-90-1 (cobamide); 262-76-0 (corinoid); 57-55-6 (Propylene Glycol); 58-61-7 (Adenosine)
 Enzyme No.: EC 4.2.1. (Hydro-Lyases); EC 4.2.1.28 (Propanediol Dehydratase); EC 4.2.1.30 glycerol dehydratase)

5/5/9 (Item 9 from file: 5) DIALOG(R)File 5:BIOSIS PREVIEWS(R) (c) 1998 BIOSIS. Allts. reserv.

10016508 BIOSIS Number: 95016508

MOLECULAR CLONING OF THE IMIDAZOLEGLYCEROLPHOSPHATE DEHYDRATASE GENE OF
 TRICHODERMA-HARZIANUM BY GENETIC COMPLEMENTATION IN SACCHAROMYCES -CEREVISIAE
 USING A DIRECT EXPRESSION VECTOR

GOLDMAN G H; DEMOLDER J; DEWAELE S; HERRERA-ESTRELLA A; GEREMIA R A; VAN MONTAGU M;
 CONTRERAS R
 LAB. VOOR GENETICA, UNIVERSITEIT GENT, K.L. LEDEGANCKSTRAAT 35, B-9000 GENT, BELGIUM.
 MOL GEN GENET 234 (3). 1992. 481-488. CODEN: MGGEA Full Journal Title: Molecular & General Genetics
 Language: ENGLISH

The *Trichoderma harzianum* imidazoleglycerolphosphate dehydratase gene (*igh*) has been isolated by complementation of a *Saccharomyces cerevisiae* *his3* mutant using a direct expression vector. This *Escherichia coli*-yeast shuttle vector was developed to allow efficient cloning and expression of cDNA libraries. The cDNA is 627 nucleotides long and codes for a protein of 209 amino acids with an apparent molecular mass of 22 466 daltons. The predicted protein sequence showed 63.6%, 58.7%, and 38.4% identity respectively to the corresponding enzymes from *S. cerevisiae*, *Pichia pastoris* and *E. coli*. Northern analysis showed that the expression of the *igh* gene in *T. harzianum* is not inhibited by external histidine and the level of *igh* mRNA was about threefold higher in cells starved of histidine.

Descriptors/Keywords: ESCHERICHIA-COLI PICHIA -PASTORIS IGH GENE MOLECULAR SEQUENCE DATA NUCLEOTIDE SEQUENCE AMINO ACID SEQUENCE EMBL-Z11528 HOMOLOGY HISTIDINE GENE REGULATION EC 4.2.1.19 METHOD

Concept Codes:

*03504 Genetics and Cytogenetics-Plant
 *10010 Comparative Biochemistry, General
 *10052 Biochemical Methods-Nucleic Acids, Purines and Pyrimidines
 *10062 Biochemical Studies-Nucleic Acids, Purines and Pyrimidines
 *10064 Biochemical Studies-Proteins, Peptides and Amino Acids
 *10300 Replication, Transcription, Translation
 *10506 Biophysics-Molecular Properties and Macromolecules
 *10802 Enzymes-General and Comparative Studies; Coenzymes
 *10806 Enzymes-Chemical and Physical
 *13012 Metabolism-Proteins, Peptides and Amino Acids
 *31000 Physiology and Biochemistry of Bacteria
 *31500 Genetics of Bacteria and Viruses
 *32000 Microbiological Apparatus, Methods and Media
 *51518 Plant Physiology, Biochemistry and Biophysics-Enzymes
 *51519 Plant Physiology, Biochemistry and Biophysics-Metabolism
 *51524 Plant Physiology, Biochemistry and Biophysics-Apparatus and Methods
 Biosystematic Codes:
 06702 Enterobacteriaceae (1992-)
 15100 Ascomycetes
 15500 Fungi Imperfecti or Deuteromycetes
 Super Taxa:
 Microorganisms; Bacteria; Eubacteria; Plants; Nonvascular Plants; Fungi

5/5/11 (Item 11 from file: 155) DIALOG(R)File 155:MEDLINE(R) (c) format only 1998 Dialog Corporation. Allts. reserv.

09298196 98012959

Propanediol utilization genes (*pdu*) of *Salmonella typhimurium*: threegenes for the propanediol dehydratase.

Bobik TA; Xu Y; Jeter RM; Otto KE; Roth JR

Department of Microbiology and Cell Science, University of Florida, Gainesville 32611, USA.
 bobik@micro.ifas.ufl.edu

J Bacteriol (UNITED STATES) Nov 1997, 179 (21) p6633-9, ISSN 0021-9193 Journal Code: HH3
Contract/Grant No.: GM49372, GM, NIGMS; GM34804, GM, NIGMS Language: ENGLISH Document type:
JOURNAL ARTICLE JOURNAL ANNOUNCEMENT: 9801 Subfile: INDEX MEDICUS

The propanediol utilization (pdu) operon of *Salmonella typhimurium* encodes proteins required for the catabolism of propanediol, including a coenzyme B12-dependent propanediol dehydratase. A clone that expresses propanediol dehydratase activity was isolated from a *Salmonella* genomic library. DNA sequence analysis showed that the clone included part of the pduF gene, the pduABCDE genes, and a long partial open reading frame (ORF1). The clone included 3.9 kbp of pdu DNA which had not been previously sequenced.

Complementation and expression studies with subclones constructed via PCR showed that three genes (pduCDE) are necessary and sufficient for propanediol dehydratase activity. The function of ORF1 was not determined. Analyses showed that the *S. typhimurium* propanediol dehydratase was related to coenzyme B12-dependent glycerol dehydratases from *Citrobacter freundii* and *Klebsiella pneumoniae*. Unexpectedly, the *S. typhimurium* propanediol dehydratase was found to be 98% identical in amino acid sequence to the *Klebsiella oxytoca* propanediol dehydratase; this is a much higher identity than expected, given the relationship between these organisms. DNA sequence analyses also supported previous studies indicating that the pdu operon was inherited along with the adjacent cobalamin biosynthesis operon by a single horizontal gene transfer.

Tags: Comparative Study; Support, U.S. Gov't, P.H.S.

Descriptors: Genes, Bacterial; *Propanediol Dehydratase--Genetics--GE; *Propylene Glycol--Metabolism--ME; *Salmonella typhimurium*--Genetics--GE; Cobamides; Gene Transfer; Genetic Complementation Test; Genomic library; Hydro-Lyases--Genetics--GE; Molecular Sequence Data; Open Reading Frames; Operon; Propanediol Dehydratase--Biosynthesis--BI; Sequence Analysis, DNA; Sequence Homology; Species Specificity
Molecular Sequence Databank No.: GENBANK/AF026270

CAS Registry No.: 0 (Cobamides); 13870-90-1 (cobamamide); 57-55-6 (Propylene Glycol)
Enzyme No.: EC 4.2.1. (Hydro-Lyases); EC 4.2.1.28 (Propanediol Dehydratase); EC 4.2.1.30 glycerol dehydratase)

9/6/1 (Item 1 from file: 155) 09434432 98096792

Construction and characterization of a 1,3-propanediol operon.

9/6/2 (Item 2 from file: 155) 09370365 98088953

A base-off analogue of coenzyme-B12 with a modified nucleotide loop--1H-NMR structure analysis and kinetic studies with (R)-methylmalonyl-CoA mutase, glycerol dehydratase, and diol dehydratase.

9/6/3 (Item 3 from file: 155) 09298196 98012959

Propanediol utilization genes (pdu) of *Salmonella typhimurium*: three genes for the propanediol dehydratase.

9/6/4 (Item 4 from file: 155) 09269790 97296406

Kinetic investigations with inhibitors that mimic the posthomolysis intermediate in the reactions of coenzyme-B12-dependent glycerol dehydratase and diol dehydratase.

9/6/5 (Item 5 from file: 155) 08744733 96394290

Cloning, sequencing, and high level expression of the genes encoding adenosylcobalamin-dependent glycerol dehydratase of *Klebsiella pneumoniae*.

9/6/6 (Item 6 from file: 155) 08744699 96422012

Cloning, sequencing, and overexpression of the genes encoding coenzyme B12-dependent glycerol dehydratase of *Citrobacter freundii*.

9/6/7 (Item 7 from file: 155) 07468997 93122543

Growth temperature-dependent activity of glycerol dehydratase in *Escherichia coli* expressing the *Citrobacter freundii* dha regulon.

9/6/8 (Item 8 from file: 155) 07439899 92121087

Sugar-glycerol cofermentations in lactobacilli: the fate of lactate.

9/6/9 (Item 9 from file: 155) 06340102 90155202

Anaerobic growth of *Escherichia coli* on glycerol by importing genes of the dha regulon from *Klebsiella pneumoniae*.

9/6/10 (Item 10 from file: 155) 04613198 83032742

The mechanism of in situ reactivation of glycerol-inactivated coenzyme B12-dependent enzymes, glycerol dehydratase and diol dehydratase.

9/6/11 (Item 11 from file: 155) 04605831 82183110

[Substrate specificity of adenosylcobalamin-dependent glycerol dehydratase. Interaction with enantiomers of 1,2-propanediol] Substratnaia spetsifichnost' adenozikobalaminzavisimoi gits'eroldehidratazy. Vzaimodeistvie s enantiomerami 1,2-propandiolu.

9/6/12 (Item 12 from file: 155) 04602186 82119943

Glycerol fermentation in *Klebsiella pneumoniae*: functions of the coenzyme B12-dependent glycerol and diol dehydratases.

9/6/13 (Item 13 from file: 155) 04581469 81006730

In situ reactivation of glycerol-inactivated coenzyme B12-dependent enzymes, glycerol dehydratase and diol dehydratase.

9/6/14 (Item 14 from file: 155) 04576639 80159893

Distribution of coenzyme B12-dependent diol dehydratase and glycerol dehydratase in selected genera of Enterobacteriaceae and Propionibacteriaceae.

9/6/15 (Item 15 from file: 155) 03809898 83049313

[Coenzyme properties of adenosylcobalamin analogs with modifications in the purine nucleus of the alpha-ligand] Kofermentnye svoistva analogov adenozikobalamina s izmenennym purinovym iadrom alfa-liganda.

9/7/13 (Item 13 from file: 155) DIALOG(R)File 155: MEDLINE(R) (c) format only 1998 Dialog Corporation. All rights reserved.

04581469 81006730

In situ reactivation of glycerol-inactivated coenzyme B12-dependent enzymes, glycerol dehydratase and diol dehydratase.

Honda S; Toraya T; Fukui S

J Bacteriol (UNITED STATES) Sep 1980, 143 (3) p1458-65, ISSN 0021-9193 Journal Code: HH3 Languages: ENGLISH Document type: JOURNAL ARTICLE

The catalytic properties of coenzyme B12-dependent glycerol dehydratase and diol dehydratase were studied in situ with *Klebsiella pneumoniae* cells permeabilized by toluene treatment, since the in situ enzymes approximate

the in vivo conditions of the enzymes more closely than enzymes in cell-free extracts or cell homogenates. Both dehydratases in situ underwent rapid and irreversible inactivation by glycerol during catalysis, as they do in vitro. The inactivated dehydratases in situ, however, were rapidly and continually reactivated by adenosine 5'-triphosphate (ATP) and Mn2+ in the presence of free adenosylcobalamin, although in cell-free extracts or in cell homogenates they could not be reactivated at all under the same reaction conditions. ATP was partially replaced by cytidine 5'-triphosphate or guanosine 5'-triphosphate but not by the beta, gamma-methylene analog of ATP in the in situ reactivation. Mn2+ was fully replaced by Mg2+ but only partially by Co2+. Hydroxocobalamin could not replace adenosylcobalamin in reactivation mixtures. The ability to reactivate the glycerol-inactivated dehydratases in situ was only seen in cells grown anaerobically in glycerol-containing media. This suggests that some factor(s) required for in situ reactivation is subject to induction by glycerol. Of the two possible mechanisms of in situ reactivation, i.e., the regeneration of adenosylcobalamin by Co-adenosylation of the bound inactivated coenzyme moiety (B12-adenosylation mechanism) and the displacement of the bound inactivated coenzyme moiety by free adenosylcobalamin (B12-exchange mechanism), the former seems very unlikely from the experimental results.

9/7/14 (Item 14 from file: 155) DIALOG(R)File 155: MEDLINE(R) (c) format only 1998 Dialog Corporation. All rights reserved.

04576639 80159893

Distribution of coenzyme B12-dependent diol dehydratase and glycerol dehydratase in selected genera of Enterobacteriaceae and Propionibacteriaceae.

Toraya T; Kuno S; Fukui S

J Bacteriol (UNITED STATES) Mar 1980, 141 (3) p1439-42, ISSN 0021-9193 Journal Code: HH3 Languages: ENGLISH Document type: JOURNAL ARTICLE

The presence of diol dehydratase and glycerol dehydratase was shown in several bacteria of Enterobacteriaceae grown anaerobically on 1,2-propanediol and on glycerol, respectively. Diol dehydratases of Enterobacteriaceae were immunologically similar, but distinct from that of Propionibacterium freudenreichii.

Tags: Comparative Study

Descriptors: *Enterobacteriaceae--Enzymology--EN; *Hydro-Lyases--Metabolism--ME; *Propanediol Dehydratase--Metabolism--ME; *Propionibacterium--Enzymology--EN; *Citrobacter--Enzymology--EN; Cobamides--Pharmacology--PD; Enterobacter--Enzymology--EN; Erwinia--Enzymology--EN; Escherichia coli--Enzymology--EN; Glycerol--Metabolism--ME; Klebsiella pneumoniae--Enzymology--EN; Propylene Glycols--Metabolism--ME; Proteus--Enzymology--EN

CAS Registry No.: 0 (Cobamides); 0 (Propylene Glycols); 56-81-5 (Glycerol)

Enzyme No.: EC 4.2.1. (Hydro-Lyases); EC 4.2.1.28 (Propanediol Dehydratase); EC 4.2.1.30 (glycerol dehydratase)

16jun98 08:59:56 User208600 Session D1155.9

File 34:SciSearch(R) Cited Ref Sci 1990-1998/Jun W1 (c) 1998 Inst for Sci Info

Set Items Description

Ref Items Index-term

E1 25 CR--TORAYA T, 1979, V139, P39, J BACTERIOL
E2 39 CR--TORAYA T, 1979, V18, P417, BIOCHEMISTRY-US
E3 0 *CR--TORAYA T, 1980
E4 15 CR--TORAYA T, 1980, V141, P1439, J BACTERIOL
E5 4 CR--TORAYA T, 1980, V191, P139, ADV CHEM SER
E6 6 CR--TORAYA T, 1980, V203, P174, ARCH BIOCHEM BIOPH
E7 5 CR--TORAYA T, 1980, V255, P3520, J BIOL CHEM
E8 1 CR--TORAYA T, 1980, V67, P57, METHOD ENZYMOL
E9 2 CR--TORAYA T, 1981, V2, P233, B12
E10 1 CR--TORAYA T, 1982, P233, B12
E11 1 CR--TORAYA T, 1982, P233, B12 BIOCH MED
E12 1 CR--TORAYA T, 1982, P233, DIOL DEHYDRASE

S1 15 CR--TORAYA T, 1980, V141, P1439, J BACTERIOL"

1/6/1 06370723 Genuine Article#: YM852 Number of References: 30

Title: Characterization, sequencing, and expression of the genes encoding a reactivating factor for glycerol-inactivated adenosylcobalamin-dependent diol dehydratase (ABSTRACT AVAILABLE)

1/6/2 06261181 Genuine Article#: YE951 Number of References: 37

Title: Heterologous expression, purification, and properties of diol dehydratase, an adenosylcobalamin-dependent enzyme of *Klebsiella oxytoca* (ABSTRACT AVAILABLE)

1/6/3 06230345 Genuine Article#: YD136 Number of References: 27

Title: A protein factor is essential for in situ reactivation of glycerol-inactivated adenosylcobalamin-dependent diol dehydratase (ABSTRACT AVAILABLE)

1/6/4 05248094 Genuine Article#: VK789 Number of References: 29

Title: CLONING, SEQUENCING, AND OVEREXPRESSION OF THE GENES ENCODING COENZYME B-12-DEPENDENT GLYCEROL DEHYDRATASE OF CITROBACTER-FREUNDII (Abstract Available)

1/6/5 05187862 Genuine Article#: VG672 Number of References: 27

Title: CLONING, SEQUENCING, AND HIGH-LEVEL EXPRESSION OF THE GENES ENCODING ADENOSYLCOBALAMIN-DEPENDENT GLYCEROL DEHYDRASE OF KLEBSIELLA-PNEUMONIAE (Abstract Available)

1/6/6 05061234 Genuine Article#: TM924 Number of References: 81

Title: EVOLUTION OF COENZYME B(12) SYNTHESIS AMONG ENTERIC BACTERIA - EVIDENCE FOR LOSS AND REACQUISITION OF A MULTIGENE COMPLEX (Abstract Available)

1/6/7 04895031 Genuine Article#: UP923 Number of References: 21

Title: EVIDENCE FOR ENANTIOMORPHIC-ENANTIOTOPIC GROUP DISCRIMINATION IN DIOL DEHYDRATASE-CATALYZED DEHYDRATION OF MESO-2,3-BUTANEDIOL (Abstract Available)

1/6/8 04071489 Genuine Article#: RC258 Number of References: 32

Title: TAXONOMIC DIVERSITY OF ANAEROBIC GLYCEROL DISSIMILATION IN THE ENTEROBACTERIACEAE (Abstract Available)

1/6/9 04048801 Genuine Article#: QK574 Number of References: 24
 Title: MICROBIAL CONVERSION OF GLYCEROL TO 1,3-PROPANEDIOL (Abstract Available)

1/6/10 03152678 Genuine Article#: NF832 Number of References: 25
 Title: PHENOTYPIC DIVERSITY OF ANAEROBIC GLYCEROL DISSIMILATION SHOWN BY 7 ENTEROBACTERIAL SPECIES (Abstract Available)

1/6/11 03089320 Genuine Article#: BZ91T Number of References: 110
 Title: DIOL DEHYDRASE AND GLYCEROL DEHYDRASE, COENZYME B-12-DEPENDENT ISOZYMES

1/6/12 02758486 Genuine Article#: MB189 Number of References: 29
 Title: PARTICIPATION OF ASPARTIC-ACID AND PYRROLOQUINOLINE QUINONE IN VITAMIN-B12 PRODUCTION IN KLEBSIELLA-PNEUMONIAE IFO-13541 (Abstract Available)

1/6/13 02183013 Genuine Article#: KH480 Number of References: 21
 Title: ASSESSMENT OF MACROPOROUS POLYSTYRENE-BASED POLYMERS FOR THE IMMOBILIZATION OF CITROBACTER-FREUNDII (Abstract Available)

1/6/14 00824062 Genuine Article#: EZ518 Number of References: 20
 Title: THE FERMENTATION OF GLYCEROL BY CLOSTRIDIUM-BUTYRICUM LMG-1212T2 AND LMG-1213T1 AND C-PASTEURIANUM LMG-3285 (Abstract Available)

1/6/15 00251953 Genuine Article#: DB131 Number of References: 13
 Title: FERMENTATION OF GLYCEROL TO 1,3-PROPANEDIOL BY KLEBSIELLA AND CITROBACTER STRAINS

1/7/5 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci (c) 1998 Inst for Sci Info. All rts. reserv.
 05187862 Genuine Article#: VG672 Number of References: 27
 Title: CLONING, SEQUENCING, AND HIGH-LEVEL EXPRESSION OF THE GENES ENCODING ADENOSYLCOBALAMIN-DEPENDENT GLYCEROL DEHYDRASE OF KLEBSIELLA-PNEUMONIAE
 Author(s): TOBIMATSU T; AZUMA M; MATSUBARA H; TAKATORI H; NIIDA T; NISHIMOTO K; SATOH H; HAYASHI R; TORAYA T
 Corporate Source: OKAYAMA UNIV,FAC ENGN,DEPT BIOSCI & BIOTECHNOL,TSUSHIMA NAKA/OKAYAMA 700/JAPAN; OKAYAMA UNIV,FAC ENGN,DEPT BIOSCI & BIOTECHNOL/OKAYAMA 700/JAPAN/
 Journal: JOURNAL OF BIOLOGICAL CHEMISTRY, 1996, V271, N37 (SEP 13), P 22352-22357 ISSN: 0021-9258 Language: ENGLISH Document Type: ARTICLE
 Abstract: The gld genes encoding adenosylcobalamin-dependent glycerol dehydrase of *Klebsiella pneumoniae* were cloned by cross-hybridization with a DNA fragment of *Klebsiella oxytoca* diol dehydrase genes. Since the *Escherichia coli* clones isolated did not show appreciable enzyme activity, plasmids for high level expression of cloned genes were constructed. The enzyme expressed in *E. coli* was indistinguishable from the wild-type glycerol dehydrase of *K. pneumoniae* by the criteria of polyacrylamide gel electrophoretic, immunochemical, and catalytic properties. It was also shown that the recombinant functional enzyme consists of M(r) 61,000, 22,000, and 16,000 subunits. Sequence analysis of the genes revealed four open reading frames separated by 2-12 bases. The sequential three open reading frames from the first to the third (gldA, gldB, and gldC genes) encoded polypeptides of 555, 194, and 141 amino acid residues with predicted molecular weights of 60,659(alpha), 21,355(beta), and 16,104(gamma), respectively. High level expression of these three genes in *E. coli* produced more than 14-fold higher level of fully active apoenzyme than that in a *pneumoniae*. It was thus concluded that these are the genes encoding the subunits of glycerol dehydrase. The deduced amino acid sequences of the three subunits were 71, 58, and 54% identical with those of the alpha, beta, and gamma subunits of diol dehydrase, respectively, but failed to show any apparent homology with other proteins.

1/7/8 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci (c) 1998 Inst for Sci Info. All rts. reserv.
 04071489 Genuine Article#: RC258 Number of References: 32
 Title: TAXONOMIC DIVERSITY OF ANAEROBIC GLYCEROL DISSIMILATION IN THE ENTEROBACTERIACEAE
 Author(s): BOUVET OMM; LENORMAND P; AGERON E; GRIMONT PAD
 Corporate Source: INST PASTEUR,INSERM,U389,UNITE ENTEROBACTERIES/F-75724 PARIS 15//FRANCE/
 Journal: RESEARCH IN MICROBIOLOGY, 1995, V146, N4 (MAY), P279-290 ISSN: 0923-2508 Language: ENGLISH Document Type: ARTICLE
 Abstract: A total of 1,123 strains representing 128 taxa in the Enterobacteriaceae (named species or subspecies and genomic species) were screened for the presence of glycerol dehydrogenases and 1,3-propanediol dehydrogenase. Only eight taxa, *Citrobacter freundii* sensu stricto, *C. youngae*, *C. braakii*, *C. werkmanii*, *Citrobacter genomospecies* 10 and 11, *Enterobacter gergoviae* and *Klebsiella pneumoniae* subsp. *pneumoniae* could grow fermentatively on glycerol and possessed both glycerol dehydrogenase type I (induced by glycerol and dihydroxyacetone) and 1,3-propanediol dehydrogenase which are typical enzymes of the anaerobic glycerol dissimilation pathway. Six other species, *C. koseri*, *E. aerogenes*, *E. intermedius*, *K. oxytoca*, *K. planticola* and *K. terrigena* could not grow fermentatively on glycerol and possessed a glycerol dehydrogenase type I but no 1,3-propanediol dehydrogenase. Other glycerol dehydrogenases types were found: type II (induced by glycerol and hydroxyacetone), type III (induced by glycerol only) and type IV (induced by hydroxyacetone only). They were widely distributed among the Enterobacteriaceae. Classification and identification may take advantage of tests exploring the dissimilation of glycerol.

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04048801 Genuine Article#: QK574 Number of References: 24
 Title: MICROBIAL CONVERSION OF GLYCEROL TO 1,3-PROPANEDIOL
 Author(s): DECKWER WD
 Corporate Source: GESELL BIOTECHNOL FORSCH MBHD-38124 BRAUNSCHWEIG//GERMANY/
 Journal: FEMS MICROBIOLOGY REVIEWS, 1995, V16, N2-3 (FEB), P143-149 ISSN: 0168-6445 Language: ENGLISH Document Type: ARTICLE
 Abstract: Glycerol produced by cleavage of natural fats can microbially be converted to 1,3-propanediol (PD) by *Citrobacter*, *Klebsiella* and *Clostridia* strains. The fermentation by *C. butyricum*, product recovery and purification has been investigated in detail up to the 2 m(3) scale. Estimation of product costs for a 10,000 t/a plant indicates that the microbial process is obviously more attractive than the chemical route. Presently, 1,3-propanediol has only a low market volume; however, its use for special polycondensates, in particular polyesters, could reduce glycerol surpluses and make plastics a easily biodegradable part of natural cycles.

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 03152678 Genuine Article#: NF832 Number of References: 25
 Title: PHENOTYPIC DIVERSITY OF ANAEROBIC GLYCEROL DISSIMILATION SHOWN BY 7 ENTEROBACTERIAL SPECIES
 Author(s): BOUVET OMM; LENORMAND P; CARLIER JP; GRIMONT PAD

Corporate Source: INST PASTEUR,INSERM,U389,UNITE ENTEROBACTERIES/F-75724 PARIS 15//FRANCE/; INST PASTEUR,UNITE ENTEROBACTERIES/F-75724 PARIS 15//FRANCE/
 Journal: RESEARCH IN MICROBIOLOGY, 1994, V145, N2 (FEB), P129-139 ISSN: 0923-2508 Language: ENGLISH Document Type: ARTICLE
 Abstract: The anaerobic glycerol pathway was studied in seven enterobacterial species selected as representative of different behaviours in terms of anaerobic glycerol dissimilation. The presence of oxidative and reductive pathways of the *dha* regulon in *Klebsiella pneumoniae* enabled the cells to grow fermentatively on glycerol. The first two enzymes of the *dha* regulon (glycerol dehydrogenase type I and dihydroxyacetone kinase) represent the oxidative branch, while the latter two (glycerol dehydratase and 1,3-propanediol dehydrogenase) represent the reductive branch of glycerol fermentation. The slower utilization of glycerol by *K. oxytoca* was attributed to low production of 1,3-propanediol. *K. oxytoca* lacked glycerol dehydratase and demonstrated low 1,3-propanediol dehydrogenase activity. *K. planticola* and *K. ozaenae* differed from *K. pneumoniae* and *K. oxytoca* in lacking the ability to grow on glycerol. *K. planticola* lacked both enzymes of the reductive branch of glycerol fermentation, and *K. ozaenae* possessed glycerol dehydrogenase only. *K. rhinoscleromatis* and *Hafnia alvei*, like *Escherichia coli*, did not possess a *dha* regulon. The glycerol dehydrogenase type II of *H. alvei* was distinct from that of *E. coli*. The phenotypic diversity of anaerobic glycerol dissimilation may have taxonomic applications.

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 03089320 Genuine Article#: BZ91T Number of References: 110
 Title: DIOL DEHYDRASE AND GLYCEROL DEHYDRASE, COENZYME B-12-DEPENDENT ISOZYMES
 Author(s): TORAYA T
 Corporate Source: OKAYAMA UNIV,FAC ENGN,DEPT BIOTECHNOL,3-1-1 TSUSHIMA NAKA/OKAYAMA 700/JAPAN/
 Journal: METAL IONS IN BIOLOGICAL SYSTEMS, 1994, V30, P217-254 ISSN: 0161-5149 Language: ENGLISH Document Type: REVIEW

